Dental

Abstracts

A selection of world dental literature / Volume 4 · Number 6 · June 1959

VOLUME 4 · NUMBER 6 · JUNE 1959

Dental Abstracts

A selection of world dental literature

Lon W. Morrey, D.D.S., editor
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AMERICAN DENTAL ASSOCIATION 222 E. SUPERIOR ST. CHICAGO 11

Published monthly by the American Dental Association at 1009 Sloan Street, Crawfordsville, Indiana. Entered as second class matter at the Post Office at Crawfordsville, Indiana, under the act of March 26, 1956. Change of address notices, undeliverable copies, orders for subscriptions, and other mail items are to be sent to editorial and executive offices, 222 East Superior Street, Chicago 11, Illinois. Printed in U.S.A. Subscription $8.00 a year in U.S.A.; $9.00 outside U.S.A. Single copy $1.00. Issue of June 1959, Vol. 4, No. 6. Copyright 1959 by the American Dental Association. All expressions of opinion and statements of supposed fact are those of the author of the abstracted article and are not to be regarded as expressing the views of the American Dental Association unless such opinions or statements have been adopted by the Association.

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Plantation

Evaluation of denture implants: a five year report

Luigi Capozzi. *Riv.mens.Svizz.odont.* 68:816-822 Sept. 1958

Five years ago, 25 partial and 11 complete denture implants were inserted in selected patients at the Institute of Clinical Dentistry of the University of Rome, Italy. Most denture implants were made of cobalt-chromium alloy; two of tantalum. Sixty per cent of the implants were inserted in the lower jaw and 40 per cent in the upper jaw.

Construction and insertion were performed in two stages with intervals varying from six hours to ten days.

Impressions generally were taken by the direct method; individualized impression trays and Kerr soft green impression compound were used.

Figure 1 Lower subperiosteal complete denture implant on a model

Figure 2 Lower subperiosteal complete denture implant inserted, showing that periosteal tissue grew into the meshwork of the implant, immobilizing it

In order to minimize the reaction of the osseous tissue to the mechanical forces exerted by functional pressure, subperiosteal implant structures were employed exclusively in accordance with the views expressed by various American and European authors. It was thereby ascertained that no specific standard impact structure was favored because every oral cavity has its own anatomic and pathologic features which require individual planning and designing.

To be successful the inserted denture implant must be able to withstand the masticatory forces without causing biologic imbalance which would impair the vitality of the oral tissues involved and thereby endanger the tissue tolerance.

In all instances in which fixation appliances such as screws and wires were attached to the denture implants to ensure a greater stability, clinical experience demonstrated that such devices only complicate the construction and insertion procedures without providing any significant benefit in attaining immobilization. Screws, splints and wires became involved in a fibrous proliferation process and lost their retention capacity within a few days.

The preferred shape of a denture implant is the pyramid form to which a shoulder may be attached. Denture implants should be placed in the

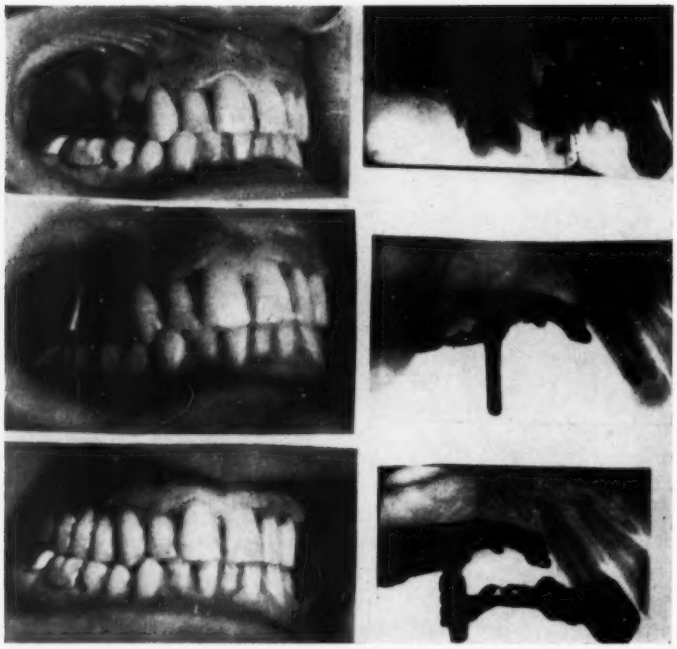

Figure 3 (Above) Unilateral upper subperiosteal denture implant ready to receive a fixed bridge to be cemented over the implant

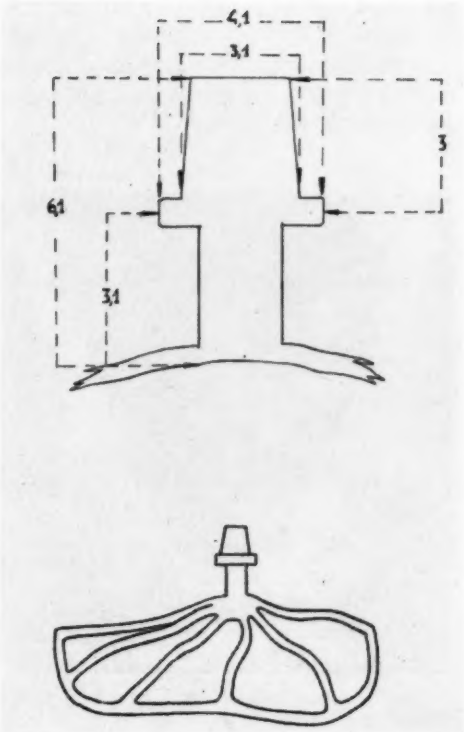

Figure 4 (Right) Design of pivot (measurements in millimeters) to be attached to meshwork implant (below)

regions between the cuspid and the second bicuspid as well as in the regions between the first and the second molars.

The dentures can be positioned on the implants about 20 days after implant insertion.

From the 36 denture implants, inserted five years ago, only one, a complete lower denture implant which had been constructed after impressions taken by the indirect method, was expelled about six months after insertion. The other 35 implants were tolerated by the tissues to varying degrees.

Two of the other 36 complete denture implants —the first with rodlike structure and the second with a meshwork structure—after two years showed a slight mobility causing inflammatory symptoms in the newly formed tissue. In both instances, future resorption of the bone underneath the implant base can be anticipated.

Experience showed that lower denture implants are generally better tolerated by the surrounding tissue than are upper denture implants. Upper denture implants seem to be better tolerated in instances in which another denture implant serves as antagonist.

Most satisfactory were the results obtained with almost all partial (unilateral) denture implants to fit fixed bridges. These implants provided adequate retention.

Less well tolerated were partial denture implants inserted for replacement of isolated teeth in instances in which the restoration could not be linked to other teeth.

Histologic examination showed that bone resorption plays an important role in failures. It is possible, however, to avoid this resorption by frequent balancing of the dentures to prevent any lateral dislodgement of the implants.

The meshwork structures, whether they were made of cobalt-chromium alloy or tantalum, generally are able to withstand the masticatory movement and do not bend either vertically or horizontally.

Despite the various handicaps, denture implants made of cobalt-chromium alloy or tantalum, inserted into human tissue for tooth restorations have a place in present and future prosthetic dentistry.

Istituto di Clinica Odontoiatrica dell'Università, Rome, Italy

Design of subperiosteal implant dentures

Boris Trainin. *A.E.O.S.I.* 2:67-75, 1959

In the designing of subperiosteal implant dentures, excessive pressure of the points of contact on osseous tissue must be avoided. For this reason, the framework of the implant should be extended over the greatest area possible. To assure that adequate pressure is applied to each abutment and transmitted evenly throughout the length and breadth of the implant, the structure must be as rigid as possible. Excessive weight or thickness causes stress exerted on the bone which supports the abutments and would, therefore, lead to bone resorption.

Bone pressure which remains within biophysiologic limits produces functional stimulation, but excessive pressure results in a gradual destruction of osseous tissue.

The ridge should remain uncovered by the metal framework except in the region where it is crossed by the abutment posts. All masticatory stresses are thereby transmitted to the framework.

Screws, undercuts, grooves and acrylic splints may be used for immediate stabilization of the implant.

One week after implant insertion, the periosteal fibers proliferate and connect the periosteum to the bone. This connection, and not the screws or undercuts, gives the implant its ultimate stability. If screws are used they may be left in position but their function is of a purely temporary nature.

The design of subperiosteal implants is greatly influenced by the individual anatomic features. A careful study of the anatomic conditions, therefore, is an important preliminary procedure.

Every aspect of the design of a subperiosteal implant denture is essentially a task for a dentist and should never be carried out by the dental technician, no matter how skilled he may be in casting of dental implants.

In the designing of mandibular implants, full advantage can be taken of the dense bone posterior to the external oblique ridge and anterior to the mental protuberance. Lingually, the implant framework is carried about 1 mm. short of the mylohyoid ridge. At subsequent visits the occlusion must be checked and spot grinding carried out wherever indicated.

Failures in maxillary implant insertion frequently are caused by inadequate covering of bone regions which normally are capable of sustaining pressure and stress. Maxillary implants should be designed with zygomatic wing attachments, extending toward the zygomatic arch, and covering a large region of the hard palate. The framework should reach high above the sulcus in the labial region, utilizing the bone of the nasal spine as well as that of the canine pillar. The advantage of this design is that the implant appears to be fixed, but can be removed easily by the dentist.

The selection of metal for the construction of subperiosteal implants is of great importance. The metal must be sufficiently hard, tough and ductile to withstand considerable stresses for almost a lifetime; it must be nonelectrolytic, noncytotoxic,

noncarcinogenic and insoluble in body fluids. After casting, the metal must retain these properties unimpaired. Alloys, composed of cobalt, chromium and molybdenum, have proved in various clinical and laboratory tests to be suitable for dental implantations.

Even the best alloy can be spoiled by using an inadequate investment material. It is essential that the investment material be chemically pure, be able to reproduce faithfully the minutest details and be efficient in expanding sufficiently to compensate for the shrinkage of the alloy during the cooling process.

Before implant insertion, preventive antibiotic treatment should be administered as a routine precaution, and vitamin therapy instituted.

Every implant should be examined roentgenographically, prior to insertion, to exclude casting defects.

Surgical procedures should be performed under a long-acting local anesthesia with suitable premedication.

109 Harley Street, London W. 1, England

A comparison of the results obtained from transplantation and replantation experiments using Syrian hamster teeth

H. I. Myers and V. D. Flanagan.
Anat.Record 130:497-507 March 1958

Transplantation and replantation experiments were performed in 30 day old Syrian hamsters at the Kansas City-Western Dental College, Kansas City, Mo.

In all animals selected for the experiments, the third molars were fully erupted and the roots completely developed. The experiments were carried out under anesthesia with intraperitoneally injected pentobarbital.

In 15 hamsters, the lower second molars were extracted and replanted immediately into the alveoli.

Sixteen hamsters of the same litter were divided into two groups of eight animals (Group A and Group B). The lower second molars of the hamsters of Group A were extracted and placed in a sterile sodium chloride solution. Later the lower second molars of the hamsters of Group B were extracted and also placed in a sterile sodium chloride solution. The molars of the Group A animals were then transplanted into the alveoli of Group B animals; the molars of the Group B animals were transplanted into the alveoli of Group A animals.

Each pair of animals was kept in one cage. All hamsters were awake shortly after completion of the operation and appeared to be quite alert within one hour.

After 30 days the animals were killed, the mandibles dissected and placed in 10 per cent Formalin for two weeks. The tissues were electrolytically decalcified, embedded in paraffin and sectioned. Every tenth section was mounted and stained with hematoxylin and eosin.

Success of experimental replantation and transplantation was judged by the extent of the viability of the pulp, the degree of attachment of the periodontal membrane, the amount of migration of the epithelial attachment apically, and the extent of root resorption. The results proved that pulp, epithelium and periodontal membrane tissues retained their inherent capacity for complete regrowth after transplantation or replantation. The regrowth of the pulp, however, appeared to be somewhat impaired in comparison to the regrowth of the other tissues. Because regrowth occurred in the transplantation experiments as well as in the replantation experiments, it can be concluded that no evidence of tissue incompatibility existed. Transplantation of a tooth from one hamster to another seems just as feasible a procedure as replantation of a tooth in the same hamster.

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Roentgenology

Routine and special examination methods with the roentgen image intensifier

G. J. van der Plaats. *M.Mundi* 3:78-86
July-Sept. 1958

Recent knowledge of the biologic effects of ionized rays, based on the results of clinical and animal experiments, proved that the roentgen image intensification technic used in dental and medical practice permits the greatest possible reduction in the roentgen ray dosage. By using this method, roentgen images can be obtained which are qualitatively superior to the images produced by the more conventional methods.

The use of roentgen image intensifiers in dental and medical practice offers two possibilities: (1) greater brightness of the roentgen images by retaining the routine examination methods without significant dose reduction, and (2) greatest possible dose limitation but requiring certain changes in the methods of examination.

The superiority of the roentgen image intensifier to the customary roentgenographic and fluoroscopic methods is demonstrated in instances in which great contrast effects are required for accurate evaluation and interpretation. Serial exposures also produce excellent results. "Aimed" exposures of regions of the body which previously were less accessible to routine roentgen examination can be carried out successfully.

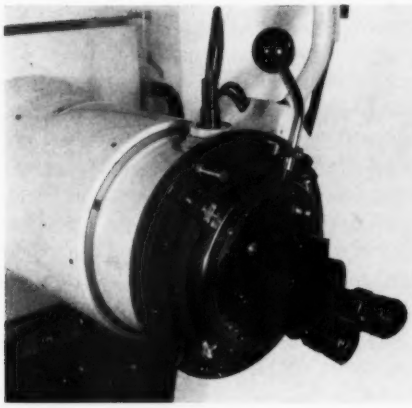
The effective field of the roentgen image intensifier is a circle with a diameter of 5 inches (12.5 cm.). In standard roentgenography, the diaphragms are always rectilinear.

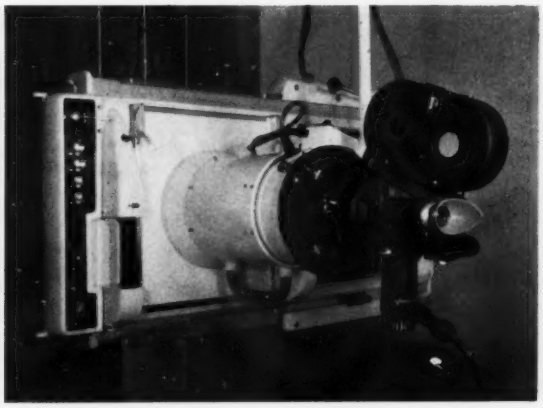
If the direct x-ray beam is limited by containing a circle within the square, a larger beam has to be used. If the square is contained within the circle, however, a part of the effective image intensification field remains unused. Preference, therefore, should be given to the second method by which a field of approximately 8 by 8 cm. can be observed. To quote the pioneer in roentgenography, Grashey: "Only the man who is miserly with x-rays is a good radiologist."

For routine application and particularly for examinations of the oral cavity, the lungs, the heart and the colon, working with the roentgen image intensifier may be termed a "makeshift." Provisions are made for interchanging image intensifiers and conventional fluorescent screens.

The larger types of roentgen image intensifiers with their field diameter of 11 inches (27 cm.), however, do not meet the requirement of easy manipulation and bright intensification.

Left: Roentgen image intensifier with binocular viewing system for fluoroscopy, using horizontal x-ray beam. Right: Roentgen image intensifier with Arriflex 35 mm. motion picture camera. Monocular viewer permits observation of images during filming





The comparatively small image intensifier enables dentists and physicians to broaden the scope of the spot-series exposure technic and to incorporate the new method into their daily routine.

Instead of direct observation, the fluorescent image can be easily photographed or filmed. The advantage of such cinematoradiographic pictures lies in the possibility of studying not only the movements but simultaneous observation of serial images.

The study of movements is of great importance in dental, especially orthodontic, research. It permits evaluation of the individual mechanism of mastication before and after insertion of dentures or orthodontic appliances.

Cinematoradiography already has won a permanent place among the dental and medical examination methods. It is, therefore, likely that the future will see the conventional fluorescent screens replaced permanently by the roentgen image intensifiers.

The reduction of the x-ray dose received by both the patient and the operator is and will be the most urgent problem in dental and medical roentgenography.

Centraal Instituut voor Radiologie, Kesselskade 53, Maastricht, The Netherlands

The effect of irradiation on the developing permanent tooth of the young cat

Takeo Murai, Atsuschi Kikuchi and Tadashi Nakamura. *Bul.Tokyo M.& D.Univ.* 5:81-109 March 1958

The effects of radiation on tooth germs, on tooth eruption and on development of the jaws were studied in 13 young cats. Only the heads were irradiated. The applied dosage was exceptionally heavy, from 1,800 to 2,000 r. At the time of irradiation, the animals were about four months old, and their teeth were in various stages of development. The effects of radiation were observed for from 13 to 375 days after irradiation.

The growth centers of all developing teeth were damaged by radiation, and this damage caused an abnormal formation of teeth. Tooth formation was disturbed in different ways, depending on the developmental stage of the tooth germ at the time of radiation. The eruption of developing permanent teeth was retarded by radiation. Diminution of the eruption mechanism was related closely to the dose of radiation. When the dose was high, the tooth could not erupt.

Radiation resulted also in a retardation in the growth of the facial skull. The growth of the shells of the ears were less affected by radiation, perhaps because of a comparatively low response of the cartilage cells to radiation.

School of Medicine, Tokyo Medical and Dental University, Bunkyo-ku, Tokyo, Japan

Lymphosarcoma in the submandibular region: report of case

Zofia Letowska. *Czas.stomat.* 9:587-594 Sept. 1958

The patient, a 51 year old man, was admitted to the Oral Surgical Clinic of the National Hospital of Warsaw, Poland, for treatment of a tumor of firm consistency occurring in the submandibular region. The neoplasm showed a tendency to ulcerate, especially on the surface exposed to the oral cavity. It consisted of several lymph nodes fused together. Both jaws were extensively involved. Extreme weakness, dyspnea, high temperature and constant coughing were the accompanying symptoms.

Metastases in the regional lymph nodes constituted the first clinical signs of the rapidly growing tumor. There were no metastases to remote regions.

Roentgenographic examination revealed extreme bony destruction in the involved region but hardly any new formation of osseous tissue.

Biopsy examination showed tumor cells with pale blue nuclei and innumerable mitotic changes.

The patient received roentgenotherapy and radium irradiation which obtained complete regression of the tumor and no recurrence was observed in follow-up examinations during the next two years. Early diagnosis and immediate treatment prolonged the survival time significantly.

Lymphosarcoma, especially in children, has a poor prognosis because its course in malignant and progressive types is fatal within a few months.

Targowa 70, Warsaw, Poland

Anesthesia and analgesia

Evaluation of a new oral resuscitator for expired-air artificial ventilation

William L. Lee, Jr., Arthur B. Tarrow and Richard J. Ward. *J.A.M.A.* 169:33-35 Jan. 3, 1959

In view of recent evidence that "mouth-to-mouth" and other forms of expired-air resuscitation are the most effective methods of artificial ventilation, the Venti-Breather oral resuscitator was evaluated. The Venti-Breather eliminates the necessity for direct mouth contact, thus rendering the procedure esthetically more acceptable. After the resuscitator inflates (Fig. 1), the patient's exhalation occurs through a one-way valve (Fig. 2). This obviates the need to remove the resuscitator's mouth from the patient during the patient's exhalation and increases the effectiveness and ease of the procedure.

The Venti-Breather is compact, simple and easy to use. It can be used by itself or in conjunction with accessory equipment such as additional face masks, oral airways and endotracheal tubes.

Evaluated for durability, the resuscitator was made to perform during 36 hours of continuous operation under simulated operating conditions; there was no detectable damage or alteration of operating ability.

The efficacy of the Venti-Breather was evaluated by determinations of arterial carbon dioxide and oxygen content and airway pressures in five adults. In all instances, the arterial carbon dioxide and oxygen content after two minutes of expired-air ventilation with the Venti-Breather was near control levels. Average values were 16.5 volume percentage for oxygen and 44.0 for carbon dioxide (control, 18.0 and 40.6 volume percentage, respectively). In samples taken after ten minutes, the average oxygen level was 17.7 volume per-

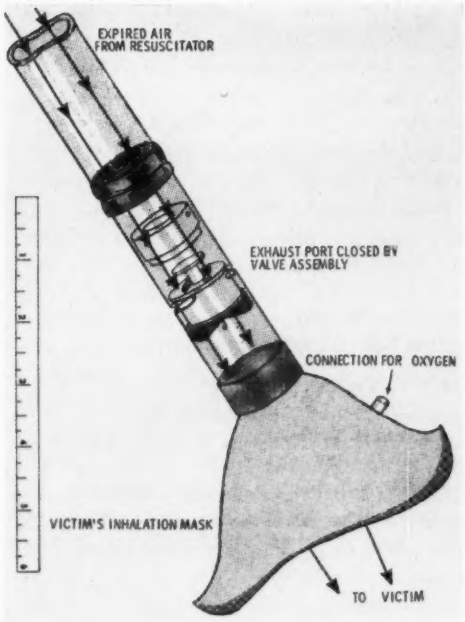


Figure 1 Inhalation phase of Venti-Breather

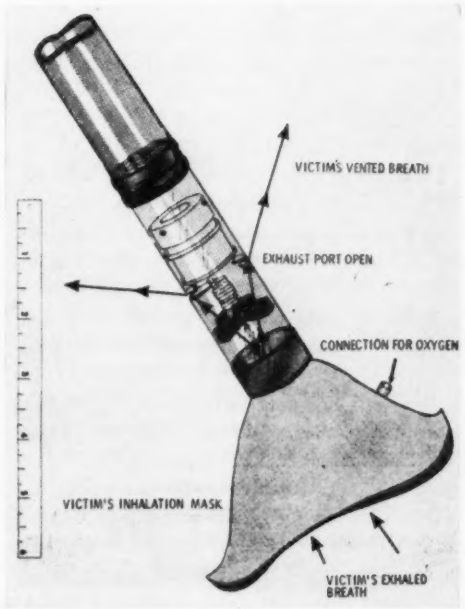


Figure 2 Passive phase of Venti-Breather

centage and carbon dioxide, 38.7 volume percentage. This would indicate that adequate alveolar ventilation had been obtained in all subjects.

Perhaps this unit or a similar unit with a mask of suitable type and three sizes of oral airways could be standardized into an expired-air resuscitation kit for general use.

Box 1559, 3700th United States Air Force Hospital, Lackland Air Force Base, Texas

Local anesthetics: agents for surface application

American Dental Association,
Council on Dental Therapeutics.
Accepted Dental Remedies 24:29-39, 1959

Anesthetic agents are applied to the surface of the oral mucosa for various purposes. They may relieve temporarily the pain of ulcers, wounds and other injuries. The topical use of anesthetic agents prior to injection may produce superficial anesthesia of the mucosa, but the deeper tissues still will be sensitive to the needle. The topical use of anesthetic agents on the oral mucosa has been found useful in taking impressions or intraoral roentgenograms in patients with an excessive gag reflex.

The use of surface anesthetics in the form of ointments or gauze packs in postextraction alveoli is a well-established procedure. Topical anesthetics may be of limited value prior to deep periodontal curettage.

A number of anesthetic agents have been employed for surface application with varying degrees of success. Aqueous solutions of many anesthetics, which are effective if administered by injection, are ineffective if applied topically. Solutions of the water-soluble salts of the potent and toxic butacaine, cocaine and tetracaine are effective surface anesthetics. Their injudicious use, however, is not without hazard. Absorption of toxic quantities of these anesthetic agents should be prevented by limiting the concentration of the drug, the area of application and the total amount of the solution applied. If anesthetic solutions are sprayed into the mouth, care should be exercised to prevent inhalation of excessive amounts of the "mist," because absorption of these drugs from the lungs may be rapid.

The possible usefulness of 0.5 per cent solution of dyclonine hydrochloride as a topical anesthetic has been suggested. This agent, however, has not been evaluated by the Council on Dental Therapeutics of the American Dental Association and no commercial forms are listed in *Accepted Dental Remedies.*

Several drugs which are effective as surface anesthetics are employed in forms with a water solubility too low to permit their use in aqueous solutions. They are soluble in alcohol, propylene glycol, polyethylene glycol, volatile oils and other vehicles. Included in this group are ethyl aminobenzoate, naepaine (Amylsine), lidocaine (Xylocaine) and chlorobutanol. Their slower absorption rates make them safer for topical use.

Preparations containing high concentrations of alcohol may be irritating if their contact with the mucosa is prolonged through the use of cotton or gauze applicators.

Several of the local anesthetic compounds used for topical application are derived from the para-aminobenzoic acid moiety which is also common to many of the drugs used as parenteral agents. The structures of these compounds differ from one another only in the alcohol portion of the ester group. Dentists who develop dermatoses after contact with procaine solutions may be sensitive to these para-aminobenzoic acid derivatives used for topical application.

222 East Superior Street, Chicago 11, Ill.

We salute Dr. Jay A. Heidbrink

Anesth.& Analg. 37:23-24 Sept.-Oct. 1958

All anesthesiologists are indebted to Jay A. Heidbrink, a dentist, for his outstanding contribution to anesthesiology which, however, was not generally appreciated by physicians. Heidbrink developed an appreciation of the factor of time in anesthesia. He recognized that almost all persons react much the same to nitrous oxide and oxygen from the standpoint of time. Accordingly, he worked out mathematically the application of these two gases to the production of both anesthesia and analgesia. The dials on his early machines had black dots and red arrows, so that the indicator could be placed properly to produce the desired result. There was even a stop watch on the gas

machine so that the anesthesiologist could be guided to the second in following the Heidbrink technic.

The factor of time constitutes a quick, effective means for the teaching of anesthesia. Heidbrink taught his method effectively in the space of a single day, and he was in great demand in dental circles everywhere, as both speaker and teacher. He was enormously patient in the instruction of others in the technic of inhalation anesthesia, and was remarkably effective.

Dr. Heidbrink died August 11, 1957. He was honored posthumously in December 1958 at Hartford, Conn., by members of the Horace Wells Club of Connecticut. Dr. Heidbrink also made notable contributions in mechanical fields. He devised a gas machine, oxygen tents and other devices for the use of gases in hospitals. A company he founded produced the oxygen mask for the use of flying personnel in World War II and manufactured the Kreiselman resuscitator for infants. Dr. Heidbrink made hanger yokes with facings that made it impossible to place a cylinder of gas in the wrong yoke; this device is now standard.

Thousands of beneficiaries of Dr. Heidbrink's constant labors owe him much for the relief of pain, even though they may never hear his name.

International Anesthesia Research Society, East 107th and Park Lane, Cleveland 6, Ohio

A new agent for shortening recovery time in oral surgery

Ralph O. Christensen. [Comment by H. W. Krogh] *Oral Surg.,Oral Med.& Oral Path.* 11:999-1003 Sept. 1958

Ritalin (methylphenidate hydrochloride), a central nervous stimulant, was used in a clinical trial in over 560 oral surgery patients ranging in age from 7 to 75 years. No attempt was made to select patients according to sex or type of operation performed. Atropine (1/150 grain) was given as a preanesthetic agent. Postoperatively, from 20 to 100 mg. of methylphenidate was injected. The average dose was 20 mg.

Most of the patients were out of the recovery room and office within 30 minutes, although recovery time ranged from one minute to, in one instance, two hours. One or two patients did not seem to respond to the drug. With methylphenidate, recovery was earlier and better, and there was no relapse of drowsiness. No instance of nausea was encountered, although the possibility of nausea must always be considered in patients who are hyperactive, no matter what anesthetic or drug is used. A more rapid return of muscular coordination and a lessening of the euphoria so common after the use of intravenous barbiturate anesthesia were observed. Except for insomnia in a few patients where higher doses (40 to 50 mg.) were given late in the day, no side effects were encountered.

In 1956 an 18 year old boy had had impacted upper and lower right third molars removed under thiopental sodium anesthesia, with 700 mg. of 2.5 per cent solution being used. The time of operation was about 15 minutes and the recovery time was about one hour. In 1957 the same patient had his impacted upper and lower left third molars removed under thiopental sodium anesthesia, with 750 mg. of 2.5 per cent solution being used. The time of operation was about 30 minutes. At the conclusion of surgery, 20 mg. of methylphenidate in 2 cc. of distilled water was given intravenously. The recovery time was about 30 minutes. This case report illustrates the author's experience with methylphenidate hydrochloride.

Comment by H. W. Krogh: "There is as yet no direct drug antagonist to the barbiturates. . . . Substances which are said to counteract barbiturate overdosage or speed barbiturate degradation produce their effects by stimulating the central nervous system and perhaps indirectly increasing metabolic rate and not by direct action against the barbiturate. Some of these drugs are shorter acting than the barbiturates, so that the awakening may be of short duration, with the patient relapsing into a deep sleep. Others are longer acting than the barbiturates and, if used to awaken quickly patients who have had a small total dose of barbiturate, produce prolonged mental stimulation which interferes with normal sleep. Finally, it is well to remember that all analeptics are central nervous system stimulants and thus increase oxygen demands in the brain. Accordingly, they should not be used in the presence of an oxygen deficit which cannot readily be corrected."

827 Marquette Bank Building, Minneapolis, Minn.

Biochemistry

Autoradiographic investigations of the distribution of F18 in mice and rats

Yngve Ericsson and Sven Ullberg. *Acta odont. scandinav.* 16:363-382 Dec. 1958 [in English]

The use of radioactive fluoride in investigating the distribution, metabolism and physiological action of fluorine in the animal body presents difficulties because of the short half-life (about 110 minutes) of F18, the only isotope that can be used. By combining rapid methods for the separation and purification of F18 with a rapid method for sectioning, the authors have been able to produce radioautographs of thin sections through the whole bodies of small experimental animals. The technic has permitted survival times up to one hour after the injection of solutions containing F18.

F18 was produced by neutron irradiation of analytically pure lithium hydroxide in the uranium reactor of the Atomenergi Co., Stockholm. The distillate consisted of a carrier-free solution of F18 with physiologically compatible pH and ionic strength. The distillate was used for intravenous or intraperitoneal injection into mice and rats.

At different time intervals after the injection of F18, the experimental animals were anesthetized and killed by immersion in carbon dioxide-acetone at about −45° C. The frozen animal was transferred to a freeze-room kept at a temperature of about −10° C. The animal was mounted in ice on a heavy microtome with a specially made large stage. The sectioning was started immediately after the frozen animal was mounted in ice. To get whole sections, adhesive tape was pressed (before each section was cut) on to the surface of the block in the plane of sectioning. The tape held the section together. Sections were made even through hard tissues such as bone and teeth. It proved possible to make 20 micron sagittal sections through the whole animal almost immedi-

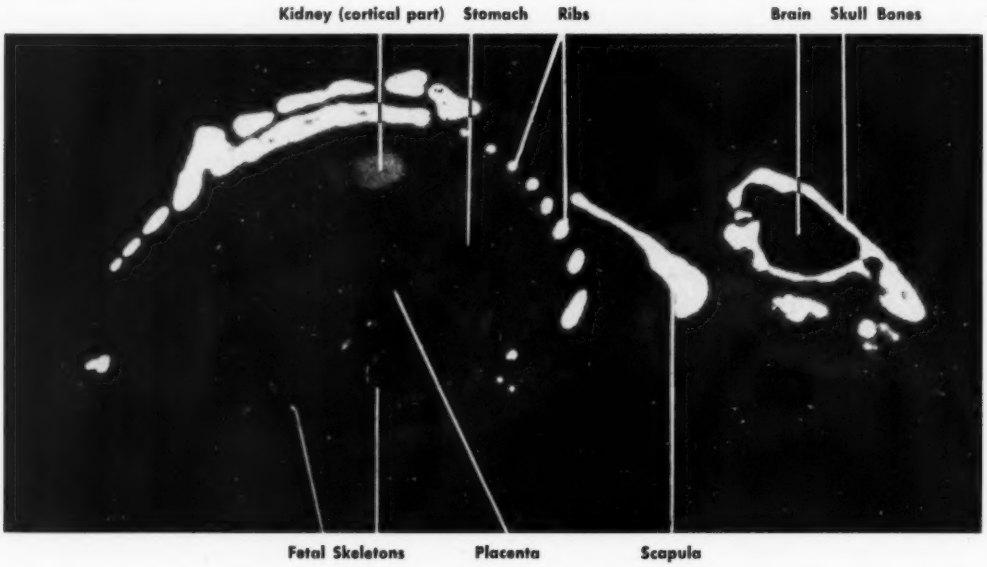


Figure 1 Radioautograph showing the distribution of F18 in a pregnant mouse 30 minutes after intravenous injection. Most of the retained fluorine is taken up in the skeleton. Some radioactivity has passed the placenta and appears in the fetal bones. The fetal soft tissues appear totally devoid of F18

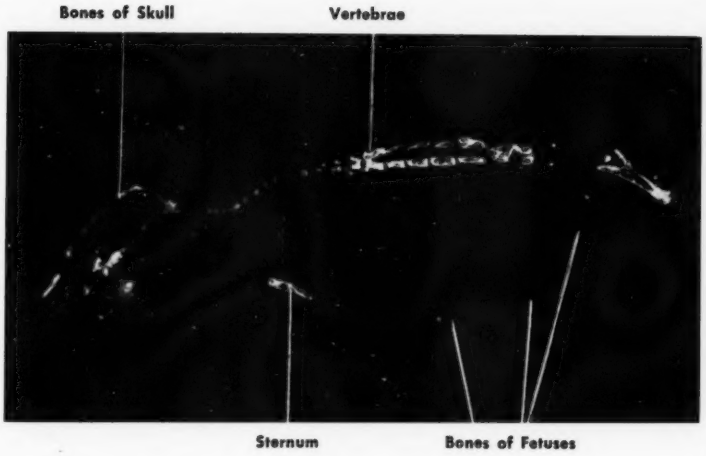


Figure 2 Radioautograph showing the distribution of F18 in a pregnant mouse 60 minutes after intravenous injection. The F18 activity has decreased, partly due to renal fluorine excretion and partly due to radioactive decay. F18 now is visible almost exclusively in bone

Figure 3 Radioautograph showing the incorporation of fluorine in the unerupted teeth of a 14 day old suckling rat one hour after intravenous injection. In the incisor is a dense inner layer corresponding to the mineralization zone of the dentin, with a somewhat lower accumulation in the outer layer of the enamel. The same distribution is seen in the molars

ately after mounting. The exposure was done by apposition against Gevaert Dentus Rapid x-ray film. Most of the exposures were made in boxes half filled with carbon dioxide acetone. The radioautographic iron presses and the photographic films were cooled beforehand. The presses generally were left overnight for exposure. The sections were removed from the films, and the films developed. Sections which were reasonably intact and corresponded to good radioautographs were stained and mounted on slides in Canada balsam.

Figures 1 and 2 are representative radioautographs of sections obtained after different survival times. Figure 3 is a radioautograph showing the incorporation of fluorine in the unerupted teeth of a 14 day old suckling rat one hour after intravenous injection.

The most striking finding is the extremely rapid

incorporation of fluorine in hard tissues. Two minutes after intravenous injection the radioautographs show a heavy uptake of fluorine in the skeleton.

No appreciable concentration of fluorine was found in any soft tissue with the exception of the kidneys during the phase of excretion. The F18 content is especially low in the central nervous system and the fetal soft tissues. The liver, the fat depots and the muscles also show a low uptake of fluorine.

The placenta forms a partial barrier to fluorine, and the amount of fluorine which passes the placenta is concentrated in the mineralized parts of the fetal skeleton. The bones take up F18, especially in the mineralization zones. The cartilage shows no affinity to F18. The unerupted teeth take up F18 in the outer layer of the mineralized enamel and still more in the inner layer of the mineralized dentin. The erupted teeth of adult rats show no visible uptake of fluorine in the enamel.

Royal Dental School, Stockholm 3, Sweden

Chemical and physical studies of enamel from human teeth: 1. Specific gravity and nitrogen content of enamel from different surfaces

B. R. Bhussry. *J.D.Res.* 37:811-815
Sept.-Oct. 1958

This study of sound enamel from teeth of known age and history was made in an attempt to establish: (1) the possible variations in the density and organic content of sound enamel taken from different surfaces of individual teeth; (2) the distribution of organic material in sound enamel taken from carious and noncarious teeth, and (3) the changes in the density and nitrogen content of enamel with age.

Only bicuspids and molars of known age were used. The density and nitrogen determinations were carried out by Melon's micropycnometric technic (1944) and a semimicro-Kjeldahl procedure, respectively.

Density and nitrogen determinations on 286 samples from sound teeth suggested that enamel from the buccolingual surfaces (155 samples) had a higher density and lower nitrogen content than enamel from the mesiodistal surfaces (131 samples) of teeth from similar age groups.

Sound enamel from noncarious teeth had a higher nitrogen content than sound enamel from carious teeth; these differences were reflected in the mesiodistal surfaces of the noncarious teeth. Pronounced density differences were not observed.

The organic content of enamel increases with age in both the buccolingual and mesiodistal surfaces. The higher organic content, however, cannot be correlated strictly with greater susceptibility to caries. Local environmental factors may play a significant role in determining the incidence of caries.

School of Medicine and Dentistry, University of Rochester, Rochester, N.Y.

The effect of saliva on the penetration of phosphate into the enamel

Yu. A. Fedorov. *Stomat.,Moscow* 36:6:3-7
Nov.-Dec. 1957

The crowns of about 300 teeth were placed in freshly collected saliva which was either untreated (active) or heated at 100° C. for from five to seven minutes (inactivated). To the saliva was added a known amount of radioactive phosphate in the form of disodium (hydrogen) phosphate (Na_2HPO_4). After 24 hours the teeth were washed, and either the radioactive phosphate was counted or radioautographs were made.

Radioactive phosphate penetrates the enamel and dentin 10 to 15 times faster in experiments with fresh, unboiled saliva than with boiled saliva. The penetration of radiophosphorus was less in alkaline than in acid solutions.

Tenfold to hundredfold dilutions of the saliva decreased the uptake of the P^{32}.

In active but not in inactivated saliva, the rate of penetration was increased when the temperature of the saliva was raised to 56° C.

The saliva from the mouths of persons with caries is less active in promoting the penetration of P^{32} than the saliva from persons without caries. The addition of glucose speeded the penetration of saliva in the experiments with active saliva, but not in those with heated saliva.

When glucose-1-phosphate was added to inac-

tive saliva, the penetration of P^{32} was speeded to the same rate as was observed in experiments with active saliva in the absence of labeled glucose-1-phosphate.

Medghis, Petrovka 12, Moscow, U.S.S.R.

The respiration of the salivary microbial flora and its relation to dental caries activity

George H. Green. *Northwest.Univ.Bul.* 59:4-12 Fall 1958

A study was undertaken to determine (1) if there is a positive correlation between dental caries activity and the endogenous respiration rate of the oral flora, and (2) if there is a correlation between dental caries activity and the rate of respiration of glucose, lactate, acetate or pyruvate by the oral flora.

Paraffin-stimulated saliva was obtained from 50 persons whose examinations showed them to belong to one of two groups: those extremely caries-active and those extremely caries-inactive.

In each of the 25 persons in the caries-inactive group, the Snyder's test indicated no caries activity; the lactobacillus count was zero, and there had been no history of dental caries experience for the past two years. In each of the 25 persons in the caries-active group, the Snyder's test indicated pronounced caries activity; the lactobacillus count was 50,000 or more, and there was a history of at least ten new carious lesions during the year prior to this study.

No correlation was found between the endogenous respiration rates of the oral flora and dental caries activity.

In the caries-inactive group there was no oxidation of acetate and only a very slight oxidation of pyruvate. The much slower oxidation of lactate as compared to the oxidation of glucose by this group tends to rule out the hypothesis of Calandra and Adams (1951) that a rapid oxidation of lactate might be responsible for the caries inactivity of such persons.

In the caries-active group there was no oxidation of acetate, a moderate respiration of pyruvate, and extremely rapid respiration of glucose and lactate.

The caries-inactive group did not commence to oxidize these substrates until four minutes after such oxidation had been initiated by the caries-active group. This difference could become of importance after the ingestion of sweets and might account for the fact that the pH is not decreased appreciably in the dental plaques of caries-inactive persons after a sugar mouth rinse.

A combination of the findings could be used as a basis for developing a new, accurate test for dental caries activity.

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Salivary gland function in rats. II. Effect of thyroid function on salivary flow and viscosity

William G. Shafer, Patricia G. Clark, David Bixler and Joseph C. Muhler. *Proc.Soc.Exper.Biol.& Med.* 98:245-247 June 1958

The present studies were designed to help clarify the role of the thyroid gland in regulating salivary gland function and to provide some clue to specific alterations in function which might explain changes in the rate of dental caries.

The effect of thyroid gland dysfunction on the salivary flow and viscosity in the rat was determined in a series of controlled experiments. Results indicate that feeding propylthiouracil, and radiothyroidectomy, reduced the salivary flow and increased the salivary viscosity. The results can be reversed and function restored by the adminstration of sodium thyroxin subcutaneously. The intramuscular injection of testosterone to thyroidectomized rats partially restored the salivary flow.

These data provide one explanation for the mechanism of alteration in the incidence of dental caries in the rat after disturbance in thyroid function, although the relation is probably more complex than indicated.

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Pathology

Etiology of sarcoidosis (Boeck's sarcoid)

Wolfgang Binder. *Deut.med.Wschr.* 83:2078-2081 Nov. 21, 1958

In sarcoidosis (Boeck's sarcoid) the oral mucosa is not infrequently involved. Formation of chronic granulomas occurs in diverse oral regions.

Sarcoidosis may be considered to be a special form of tuberculosis, caused by a "positive anergy" of the body to *Mycobacterium tuberculosis.*

The relationship between sarcoidosis and tuberculosis has been under discussion for many years. At the Second Internal Clinic of the District Hospital of Göppingen, Germany, a 52 year old man with sarcoidosis was observed. The lymph nodes, the facial skin and the oral mucosa were particularly involved. The nodules of the sarcoma-like tumors had displaced or destroyed the normal tissue in the affected regions.

In the initial phase the disease took the clinical and morphologic form of a predominantly granular tuberculosis. Lupus vulgaris of the face and the oral mucosa developed during the second phase. The saliva contained *M. tuberculosis.*

The later course was characterized by the persistence of the cutaneous manifestations on the face and in the mouth. There was a decreased tuberculin sensitivity and a relatively good general health condition.

This indicated in retrospect that the disease had been from its onset sarcoidosis of the lymph nodes, the facial skin and the oral mucosa. The protracted course of the disease, however, simulating the symptoms of tuberculosis, can be considered as adequate evidence for the tuberculous cause of sarcoidosis.

Roentgenotherapy, ultraviolet irradiation and the administration of arsenicals were used in the, unfortunately unsuccessful, treatment. The patient died of heart failure.

Kreiskrankenhaus, Göppingen, Germany

Relations between Hodgkin's disease and sarcoma

E. Kellner. *Arch.Geschwulstforsch.* 12:179-183 June 1958

Histologic studies of specimens obtained from 32 patients with Hodgkin's disease, supplemented by macroscopic and anatomic examinations, resulted in the following findings:

The 23 patients represented the classical, granulomatous type of Hodgkin's disease with painless and progressive enlargements of the lymph nodes, beginning at the neck and spreading to other parts of the body.

Two disease forms could be distinguished: (1) an acute form, protean in its clinical manifestations, and (2) a chronic but comparatively benign form largely confined to the lymph nodes and exhibiting only limited systemic involvement.

Tumors resembling reticulum cell sarcomas occurred in the tonsils or in the lymphoid tissue of the nasopharynx and in only nine instances in the oral cavity where they appeared as friable, ulcerating masses which increased rapidly in size, causing destruction of osseous tissue. In these nine patients, the lymphocytes and eosinophil cells did not dominate the clinical picture. Giant cells and mononucleated reticular cells were numerous. In all instances in which the oral cavity was involved, a sarcomatous manifestation was present. In six of these patients, an accumulation of eosinophil cells was found in the marginal regions of the foci, producing an intermediate form of the disease: Hodgkin's sarcoma.

The existence of transitional forms between the miliary and nodular types of the disease and also between granulomatous and sarcomatous formations suggests that Hodgkin's disease may be considered as a primary sarcoma.

Granulomatous formations of the nodular type, with encapsulated foci, may last for many decades and show spontaneous remissions.

Such clinical manifestations justify the assumption that Hodgkin's disease represents a special type of chronic inflammation and that both the benign and the malignant form are closely related to sarcoma. Tumors associated with Hodgkin's disease may become transformed into sarcomas.

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Erythema multiforme limited to the oral cavity: report of a case

Irwin Lighterman. *Oral Surg.,Oral Med. & Oral Path.* 11:1237-1243 Nov. 1958

Symptoms of erythema multiforme include headache, malaise, nausea, cough, pharyngitis, arthralgia, prostration and, frequently, high temperature. A few days after onset, lesions develop in many widely scattered parts of the body, most commonly on the hands, feet and other cutaneous surfaces, and often in the mouth, on the genitals, anus and nose. Most patients are young adults. The incidence of the disease increases in the period from January to June.

Erythema multiforme is a self-limiting disease, lasting from one to three weeks. Hyperpigmented skin lesions often persist but disappear in time. Repeated episodes commonly are reported.

Oral involvement frequently follows the acute symptoms by a few days. Reported instances are rare in which the condition is limited to the mouth. The primary lesion is a round to oval vesicle or bulla forming on an erythematous base. Because of moisture and trauma, the vesicles rupture in from 24 to 48 hours, leaving ulcers covered by a necrotic exudate or pseudomembrane. Ulcerations may become confluent. Pain, sialorrhea and dysphagia occur after denudation of the surface epithelium. These lesions become unusually susceptible to secondary infection which causes high temperature, halitosis and accentuation of the previous symptoms. Frequently, crusted bleeding lesions develop on the lips. Cervical lymphadenopathy may or may not be present.

The etiology of erythema multiforme is unknown. Pemphigus bullae, because they develop on what appears to be normal epidermis, can be distinguished from those of erythema multiforme. Herpetic stomatitis resembles erythema multiforme in its rapid onset of acute symptoms and vesicle formation but differs in that the former frequently affects the gingiva, a virus can be demonstrated, the lesions are limited to the oral cavity, and regional lymphadenopathy invariably occurs. Stomatitis medicamentosa is difficult to distinguish from erythema multiforme; the history of a recently used drug should be grounds for further investigation. In human foot and mouth disease, vesicular eruptions may be present in the mouth and on the extremities; inoculation of a guinea pig with material from the lesion will demonstrate the presence of a virus if human foot and mouth disease is present. Syphilitic chancre can be ruled out by dark-field examination of the lesions.

There is no agreement among investigators on treatment. Inasmuch as the disease is self-limiting, treatment should be symptomatic. Corticosteroids will resolve the process rapidly, but certain undesirable side reactions preclude their general use. Antibiotics may be employed to prevent secondary infection. A bland mouthwash will maintain oral hygiene, and ethyl aminobenzoate troches or viscous lidocaine will relieve mouth soreness.

A case report of erythema multiforme with lesions limited to the oral cavity is presented.

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Malignant giant cell tumors

G. Taubert. *Zbl.Chir.* 83:209-215 June 1, 1958

There are still great discrepancies in the differential diagnosis of a true malignant tumor and a reactive granulomatous process. The spindle cells are parts of the neoplasm together with the characteristic osteoclastic giant cells.

Paget in 1853 described the giant cell tumors as brown and myeloid tumors. According to Jaffe and Lichtenstein they should be classified as semimalignant tumors. Stewart coined the term "osteoclastoma" to emphasize the frequency of preceding trauma.

There exists a great similarity between osteolytic sarcoma and giant cell tumor. In both neoplasms, secondary malignant changes occur frequently.

Myerding, in his serial examinations of 124 patients with central giant cell tumors of the maxillofacial region, found 23 tumors to be malignant.

The development of giant cell tumors can be explained either on a neoplastic or an inflammatory basis. The fact that these tumors rarely metastasize is not as significant as one might think because other highly malignant tumors of

the jaws such as osteogenic sarcomas are slow to metastasize, although they may spread rapidly by invasion to other bones of the skull.

In the case reported, the patient, a 13 year old boy, complained of pain and swellings of the lower jaw. Roentgenographic changes were first diagnosed as tuberculosis, and later as an osteitis fibrosa. After the delayed biopsy, thorough curettage had to be carried out followed by chemical cauterization of the tumor-bearing area. There were multiple mitoses with proliferating spindle cells and giant cells, some of them with more than 20 nuclei.

The mesenchymal type of this tumor should be considered as a primary malignant tumor forming a special group between the benign osteoclastoma and the malignant osteogenic sarcoma.

Some authors advise postoperative roentgenotherapy but never irradiation without surgery.

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Cancer of the lip

T. Schrire. *South African M.J.* 32:776-780 Aug 2, 1958

The incidence of carcinoma of the lip in South Africa is high. In the period from 1949 through 1956 more than 500 patients with carcinoma of the lip were referred to the radiotherapy department of the Groote Schuur Hospital. Most such patients were elderly European men. The lower lip is about ten times as commonly involved as the upper. Occasionally, multiple, simultaneous and separate carcinomas of the lip have been seen. A large proportion of patients have been outdoor workers. Perhaps the excessive exposure to the sun and wind associated with outdoor life is responsible for most cancers of the lip.

The typical lip cancer starts as a small, hard nodule which develops slowly on the lower lip, usually to one side of the mid-line. The nodule occurs on the exposed surface near its cutaneous border, is painless, and is often unnoticed by the patient. The relative rarity of the disease in women and in the upper lip is noteworthy.

The following classification of cancer of the lip is proposed: (1) cutaneous carcinoma of the lip, typically starting at the external red margin; (2) mucous or buccal carcinoma of the lip, which typically occurs in colored patients and should be classified as a cancer of the mouth, and (3) angular cancer of the lip, which usually starts on the buccal side of the lip and adjacent cheek and gradually becomes visible at the angle of the lip.

Cancer of the lip is less malignant than cancer of the mouth and more malignant than rodent ulcer of the face. Metastases develop more slowly with cancer of the lip than with cancer of the mouth. The outlook in the average instance of cancer of the lip is good. The mortality rate has been 6 per cent; those who die are mostly those who come to the clinic with glands already invaded, or whose primary lesion was more than 2 cm. in diameter at the first visit. If the disease is seen early, it can be treated successfully with relatively simple methods. If the disease is seen at a late stage, massive operation is required.

A biopsy always should be done in all suspected instances. If the lesion is smaller than 0.5 cm. in diameter, a wedge excision biopsy is performed with a 1 cm. margin on either side; this procedure is curative as well as diagnostic. Lesions that are larger are treated with roentgenotherapy; divided doses of 5,000 to 6,000 r constitute the treatment of choice in most cancers of the lip. Surgery is indicated when roentgenotherapy has failed, when a "cancer paste" has been used, when glands are invaded and palpable, and when the mandible is involved. Enlarged lymph glands should be treated surgically.

Groote Schuur Hospital, University of Cape Town, Cape Town, South Africa

Cirrhosis and other predisposing factors in carcinoma of the tongue

N. Trieger, I. I. Ship, G. W. Taylor and D. Weisberger. *Cancer* 11:357-368 March 1958

An investigation to determine whether a relationship exists between supposed etiologic agents and carcinoma of the tongue was carried out at the Tumor Clinic of the Massachusetts General Hospital in Boston. The histories of all clinic patients with carcinoma of the tongue were reviewed.

Etiologically, various factors have been suggested in the literature. The association between lingual cancer and syphilitic glossitis has been

well established. The successful treatment of oral leukoplakia with estrogenic hormones suggests that a possible deficiency or alteration in the metabolism of sex hormones might evoke a substrate change that renders these patients more susceptible to the development of mucosal cancer, especially carcinoma of the tongue (Nathanson and Weisberger).

The case reports were classified according to four factors: (1) the use of tobacco; (2) the consumption of alcohol; (3) the presence of syphilis, and (4) the presence of chronic oral trauma.

Of the 108 patients investigated, 97 (89.8 per cent) were classified as smokers; in 20 (18.5 per cent) there was evidence of syphilis. Hepatic cirrhosis, obviously caused by extreme consumption of alcohol, was found in 46 patients (44.4 per cent), and in 74 (70 per cent) oral trauma of various causes was established. Of the 108 patients, 86.6 per cent had a combination of some or all of the four predisposing factors.

The over-all impression gained from these data consists in evidence that carcinoma of the tongue obviously is caused by a number of etiologic factors acting simultaneously.

357 Harvard Street, Cambridge, Mass.

Pigmentation of the gums

J.A.M.A. 168:1296 Nov. 1, 1958

Q.—A 16 year old boy had pronounced dark pigmentation of the gums, such as is ordinarily seen in Addison's disease. However, there were no additional symptoms of this disease. The 17-ketosteroid level was within normal range, and the 24 hour excretion was doubled after the use of adrenocorticotropic hormone (ACTH). There was no evidence of heavy metal poisoning. Laboratory studies were within normal range. What other conditions should be considered to produce increased pigmentation of the gums in a boy this age?

A.—Pigmentation of the attached gingival tissues, and at times of the oral mucosa and lips, may develop in any dark-complexioned patient. This physiological pigmentation usually develops fully during the second decade. Gingival pigmentation is the result of the deposition of increased amounts of melanin. Oral mucosal pigmentation also may be found in patients with intestinal polyposis. It may be present in the familial form of polyostotic fibrous dysplasia (Albright's disease). The administration of certain drugs, for example, quinacrine hydrochloride, may be associated with a yellowish pigmentation of the oral tissues. In the absence of any clinical or roentgenographic findings suggestive of intestinal polyposis or polyostotic fibrous dysplasia, it is most likely that the gingival pigmentation is physiological.

545 North Dearborn Street, Chicago 10, Ill.

Moniliasis of the oral cavity

Boris Bily. *Československ.stomat.* 58:38-44 Feb.-March 1958

Moniliasis of the oral cavity can be divided into three types: monilia stomatitis (thrush), monilia glossitis and perlèche.

In monilia stomatitis, scrapings from the white patches appearing on the oral mucosa yield in smear tests and cultures one of the saccharomycetes (ascomycetous fungus) which usually are unicellular and contain granules and ascospores. In the majority of instances, *Candida albicans* is the causative fungus. Lesions develop in the superficial layers of the epithelium and the filaments form a dense network of epithelial cells which later show degenerative changes.

The disease occurs mainly in bottle-fed infants. It seldom occurs in adults except in association with tuberculosis. *C.albicans* sometimes is present in patients who show no clinical symptoms of stomatitis but who neglect oral hygiene. The microorganisms often grow beneath unclean dentures and may be associated with denture sores. Other factors, however, must be active before the microorganisms become pathogenic. Such a predisposing factor is riboflavin avitaminosis.

The mucous membrane of the oral cavity appears covered with numerous white patches, their favorite sites being the inner cheek and the tongue. The white patches coalesce and form large white or cream-colored raised plaques which if removed leave an erythematous surface. Later the patches become greyish yellow and peel. Monilia stomatitis must be differentiated from leukoplakia.

Treatment consists of applying a mild antisep-

tic (such as a 1 per cent solution of methylrosaniline chloride) to the lesions. A 10 per cent solution of sodium caprylate, applied four times daily, eliminates *C. albicans* within one week. Attention should be given to proper oral hygiene, including the use of antiseptic mouthwashes. In infants, riboflavin (from 5 to 15 mg.) should be administered daily and the nursing technics used should be such as to prevent spread and recontamination.

Perlèche is an intertriginous inflammation occurring at the angles of the mouth. It is caused by either *C. albicans* or another species of sacchromycetes. In this disease also riboflavin deficiency is a predisposing factor. The lesions usually are bilateral ulcerations. The oral mucosa is thickened and macerated. In adults the condition tends to become chronic.

Treatment consists in spraying the lesions with a mild antiseptic. The standards of general and oral hygiene should be improved. In view of the fact that perlèche often is associated with multiple avitaminosis, the types of vitamins which are lacking should be determined prior to treatment. In most instances of moniliasis of the oral cavity, excessive use of antibiotics is contraindicated.

Dental Clinic of the University of Brno, Czechoslovakia

Jacob's disease

J. Bercher. *Cah.odontostomat.,Marseille* 8:17-33 Oct.-Dec. 1958

In 1899, O. Jacob, professor of the Dental School of Val de Grâce, described exostoses of the jaws associated with localized peripheral overgrowth of the cheek bone and a conical prominence ascending from the upper anterior part of the mandibular ramus. Unilateral hyperplasia of the condyloid process leads to constriction of the jaw.

Since that time, the syndrome has been known as Jacob's disease. Various theories have been offered to explain the pathogenesis of this abnormality; the suggestion of early authors that Jacob's disease is a sign of degeneration has not been substantiated. It may be regarded as a delayed continuation of growth of the involved bones in a somewhat perverted direction. In humans, the disease occurs infrequently but it has been observed in anthropoid apes.

The disease must be differentiated from partial gigantism which usually is caused by endocrine disorders and also is often associated with multiple exostoses on the buccal aspect of the alveolar bone.

In mild instances no treatment is indicated. If the exostoses are large and cause discomfort or if they interfere with the fitting of a denture, the overgrowth should be removed by surgical excision of the elongated condyloid process. Constriction of the jaws, usually associated with malocclusion, should be treated as soon as possible.

17 Montée des Accoules, Marseilles, France

Diphtheria and infectious mononucleosis in differential diagnosis

A. Heller. *München.med.Wschr.* 100:1174-1179 Oct. 30, 1958

Of 26 patients who were admitted to the clinic of the Municipal Hospital of Munich, Germany, with a diagnosis of stomatitis caused by diphtheria or being suspected of having diphtheria of the lips or the oral mucosa, not one displayed the development of the oral, laryngeal and pharyngeal symptoms caused by *Corynebacterium diphtheriae*. Diagnosis of tonsillitis was established in 12 patients, and that of infectious mononucleosis in 14.

This high percentage of an erroneous clinical diagnosis obviously resulted to a large extent from the initial symptoms of infectious mononucleosis which often simulate diphtherial manifestations.

Considerable localized petechiae appearing in the region of the palate in patients whose general health condition is not (or only slightly) impaired, and in whom the circulation is unaffected suggests the presence of infectious mononucleosis rather than that of diphtheria.

An initial temperature above 101°F. (38.5°C.) which remains or rises higher during the usual treatment, is indicative of infectious mononucleosis. The values of the initial temperature in infectious mononucleosis are as a rule above the typical temperature values in diphtheria.

The appearance of massive, enlarged lymph nodes in the submandibular region, the angles of the jaws, along the sternocleidomastoid muscle

and in the nuchal and inguinal regions, is of considerable help in establishing the diagnosis of infectious mononucleosis.

Correct diagnosis may be confirmed by hematograms in which the leukocytes will vary from 3,000 to 26,000, the segmentation nuclei from 5 to 25 per cent, the lymphocytes from 50 to 95 per cent and the monocytes from 10 to 23 per cent. The Hanganatziu-Deicher reaction shows a titer of 1:112 in patients with infectious mononucleosis as compared with the titer of 1:56 per cent in normal persons.

Attempts have been made to identify the causative microorganism but without success. The available evidence, however, suggests that a filtrable virus causes all three of the established types of infectious mononucleosis: (1) the glandular form; (2) the anginose form, and (3) the febrile form.

Städtisches Krankenhaus, Munich, Germany

Enlargement of the parotid gland in alcoholic cirrhosis

H. Bonnin, G. Moretti and A. Geyer.
Presse méd. 66:1449-1451 Oct. 27, 1958

Bilateral painless swelling of the parotid gland is a common symptom in patients with alcoholic cirrhosis. Similar enlargements of the gland are also seen in diseases caused by malnutrition such as kwashiorkor. This proves that alcoholic cirrhosis is a generalized disease which affects not only the gastrointestinal tract and the liver but many other regions. There exists a definitive analogy between this disease and nutritional deficiencies.

Histologic and histochemical examinations of specimens obtained by biopsies and autopsies revealed that the parotid glands are extremely aquiparous. In the adjacent segments there was cellular hypertrophy and an increase in size of the acini associated with foci of hyperplasia.

The entire secretory cycle of all salivary glands was greatly disturbed. In some instances, adenomatosis was present. It appears that the aquiparous condition of the involved glands was produced by exhaustion after hyperfunction.

The quantity of salivary amylase was determined, and this information added to the histologic findings indicated that the increase in volume of the parotid gland was an adaptation of the glandular tissues to the salivary hyperfunction.

The physiopathologic mechanism of this salivary hyperfunction, however, is unknown.

120 Boulevard Saint-Germain, Paris 6, France

Cancer of tongue: 100 cases

V. E. Argonz. *An.cir.* 23:35-39
Jan.-March 1958

One hundred patients with cancer of the tongue were seen at the Tumor Institute of Rosario, Argentina, between 1944 and 1954. Eighty-three were men and 17 were women, and most were between the ages of 50 and 70 years.

The cancer was located at the base of the tongue in 42 patients; it involved the three thirds of the movable part of the tongue in 5 patients and one or two thirds of the movable part of the tongue in 43 patients. In the remaining 10 patients the cancer was located either at the lateral edges or at the ventral surface of the tongue. The tumor was basal cell epithelioma in 93 patients, carcinoma in situ in 1, hemangioendothelioma in 1, tumor of the mixed glandular and mucous type in 1, carcinoma with reticular cells in 3, and fibrosarcoma in 1. The basal cell epithelioma was of the second or third degree of cellular differentiation in almost all instances. Cervical metastases were found in 65 patients on hospitalization, and they developed in the course of treatment in 6 patients, and did not appear in 29 patients. Fourteen patients were at the inoperable stage of the disease and were given no treatment. In the remaining 86 patients, the treatment consisted of roentgenotherapy to 30 patients, radium to 15, surgical removal of the cancer lesion from the tongue in 3, combined roentgen and surgical treatment in 9, and radium combined with surgery in 29 patients.

Metastases at a distance appeared in nine patients in the course of treatment. Generally, the metastases were in the liver, lung or cervical vertebrae, but in some instances the metastases appeared in the form of diffuse carcinoma. They were the immediate cause of death in all nine patients.

Forty-nine patients (including the 14 in the inoperable stage of the disease) died within one

year after hospitalization; 30 patients are living without any recurrence or residual lesion, of whom 15 have lived for more than five years after treatment.

Cancer of the tongue is almost as frequent as cancer of the lips or of the larynx, and the prognosis is poor. The treatment should be conducted as follows: Interstitial radium when the lesions are located at the movable part of the tongue, teletherapy when the lesion is at the root of the tongue, and radical dissection when there is cervical adenopathy. Cervical adenopathies should not be dissected early but only when they are clinically demonstrable. Dissection en bloc is indicated when the primary tumor cannot be controlled, as shown by histologic examinations.

Tumor Institute, Rosario, Argentina

Diseases of the salivary glands

J. Skládal. *Časop.lék.česk.* 47:1267-1269
Oct. 3, 1958

The most frequent causative factors of inflammation of the salivary glands are foreign bodies—particularly calculi—and invasions from neighboring tissues. Trauma and dehydration sometimes influence the development of infections of the salivary glands.

Effective therapeutic agents are sulfadiazine and antibiotics. Hydration of the involved gland must be initiated and maintained. Wide incision and massive drainage are required when a circumscribed accumulation of pus is present.

Chronic infective granulomas are comparatively rare in the salivary glands. A noncaseating type of tuberculosis, however, occasionally is observed. Actinomycosis responds most satisfactorily to treatment with sulfonamides or penicillin.

Dysfunction of salivary glands usually is the result of lesions of the peripheral secretory nerves. In the majority of instances, the normal salivary flow can be restored by the administration of pilocarpine. The effect of this drug may be augmented by the simultaneous ingestion of ammonium chloride, an acid forming salt.

The most frequent neoplasm of the salivary glands is the mixed tumor. Soft tumors of these glands are more prone to exhibit carcinomatous alterations than the hard and firm neoplasms. They are devastating in their clinical course and tend to change into rapidly proliferating carcinomas.

Surgical enucleation usually is successful. When these tumors recur, however, further surgical efforts are futile.

Pathologic-physiologic Clinic, University of Prague, Czechoslovakia

Pigmentation of lips and oral mucosa associated with hereditary intestinal polyposis

H. Begemann. *Klin.Wschr.* 36:873-920
Oct. 1, 1958

In 1921, J. L. A. Peutz described a syndrome consisting of hereditary intestinal polyposis and melanin pigmentation of the facial skin, oral mucosa, lips and extremities. Harald Jeghers, in 1949, confirmed Peutz's findings. Since then, this condition is known as Peutz-Jegher's syndrome.

Four patients with hereditary intestinal polyposis were treated at the polyclinic of the University of Freiburg/Breisgau, Germany. In all of them, melanin spots on lips, oral mucosa and digits were observed. The pigmentation was punctated and varied in color from light brown to black. The marks on the lips could not be obliterated by lipsticks.

According to the patients' histories, the lesions had been present as long as the patients could remember. In only one patient was it possible to establish beyond doubt that the pigmentation had been present at birth. In this instance, a relevant family history could be determined. Two of the patient's brothers had the characteristic melanin pigmentation on and around the lips and the oral mucosa but by middle life no symptoms had appeared which could be attributed to hereditary intestinal polyposis. There is, however, presumptive evidence that the syndrome is familial and is transmitted as a dominant Mendelian characteristic.

Medizinische Universitäts-Poliklinik, Freiburg/Br., Germany

Oral surgery

Air evacuation of maxillofacial patients

Lucian Szmyd and Clarence M. McCall, Jr.
Air Univ.,School Aviat.Med. 1-9 Oct. 1957

The air evacuation of patients with maxillofacial injuries is an important aspect of military aviation medicine, and one requiring special consideration. Experiences during World War II and the Korean conflict have demonstrated the value of three important measures in such evacuation: (1) early temporary stabilization; (2) control of motion sickness, and (3) quick release mechanisms of jaw fixation.

Early temporary stabilization in facial trauma has vital therapeutic implications. It will aid in the control of shock, infection, pain, swelling, trismus and hemorrhage, and will promote patient comfort, simplify feeding, improve morale and reduce the need for nursing care.

Many patients with maxillofacial injuries are not seen by the dental officer until they arrive at a major treatment center. The medical officer, therefore, is responsible for applying early temporary stabilization. A simplified technic of intermaxillary fixation, supplemented by a head bandage for support of the mandible, is the method of choice for attaining temporary stabilization. In maxillary fractures, the intact mandible is used as a splint against which the elements of the maxilla are repositioned and immobilized. In mandibular fractures, the intact maxilla is used as the splint. Stainless steel wire about 0.02 inch in diameter is ideal. A minimum of two posterior teeth in each quadrant are selected for wiring, and the following technic used:

1. A two-inch length of wire is passed around the neck of the selected tooth (Fig. 1, above left).
2. The wire is twisted tightly with a hemostat to prevent its slipping over the crown.
3. The free ends are twisted (Fig. 1, above right).
4. The twisted wire is cut a half inch from the tooth.
5. A tight loop is formed with the twisted end (Fig. 1, below left).
6. The loop is adapted against the gingiva.
7. Similar loops are formed on all of the teeth selected for wiring.
8. Small intermaxillary elastic bands are anchored on these curved loops so that the forces tend to bring the upper and lower jaws together (Fig. 1, below right).
9. The supplemental head bandage (Fig. 2) is applied.

If a limited armamentarium precludes stabilization by intermaxillary traction, a head bandage alone may be employed.

Prophylactic measures instituted by the flight surgeon to reduce the incidence of motion sickness include dietary control, psychotherapy and the use of drugs.

Air Force regulations state that patients with permanently fixed tie-wires between the jaws

Figure 1 Simplified wiring technic for early temporary stabilization

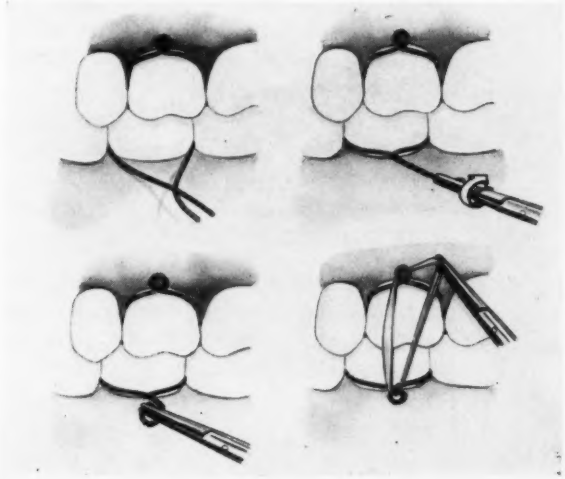

Figure 2 Head bandage for temporary stabilization. A = gauze bandage, B = safety pins, C = rubber bands, D = adhesive tape

normally are not acceptable for air transportation. Patients with immobilized jaws may experience serious respiratory difficulties resulting from aspiration of vomitus incidental to motion sickness.

When intermaxillary tie-wires are replaced by elastics, the following precautionary measures are recommended:

1. One tie-wire is cut at a time and replaced immediately by an elastic. (When all the tie-wires are cut simultaneously, occlusion may be distorted by muscle pull on the unsupported fractured elements.)

2. Bandage scissors, suitable for cutting elastics and wires, are attached to the patient. Both the patient and the medical flight personnel are instructed as to the use of these scissors in releasing the jaws.

3. A quick-release mechanism for jaw fixation, which can be activated by the patient or attendant, may be devised as follows: The point of a 15-gauge needle is blunted. A small elastic band

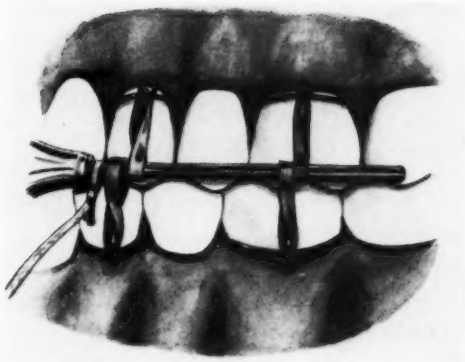

Figure 3 Modified "cotter-pin" technic for quick release of intermaxillary jaw fixation

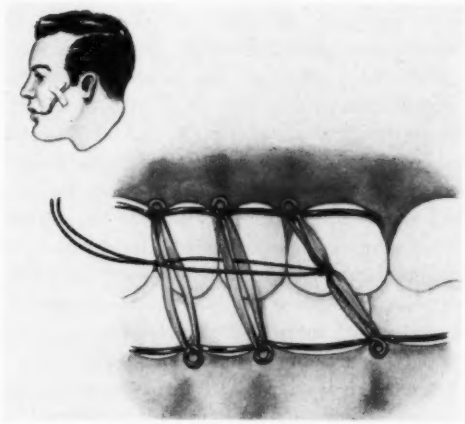

Figure 4 "Rip cord" technic for quick release of intermaxillary jaw fixation

is attached to an intramaxillary loop, and the needle is passed through the band. This procedure is repeated for alternate loops on the maxillary and mandibular teeth. A strong cord is tied to the needle to facilitate rapid removal (Fig. 3). The free end of the cord is taped to the patient's cheek.

An alternate technic is to pass a strong cord through the lumen of each intermaxillary elastic band and tape the free end of the cord to the patient's cheek (Fig. 4).

Research Dentistry Division, Air University, Randolph Air Force Base, Texas

Personality characteristics of patients treated in a Veterans Administration Hospital for fractures of the maxilla and mandible

Heyl G. Tebo. *Oral Surg.,Oral Med.& Oral Path.* 11:681-687 July 1958

The case histories of 247 patients admitted to the Veterans Administration Hospital in Houston, Texas, for treatment of fractures of the mandible or maxilla were studied to obtain information regarding the cause of the fractures and the personality characteristics of the patients.

The largest group, 114, fell between the ages of 21 and 30 years. There were 72 patients between 31 and 40 years old, and 37 patients between 41 and 50 years old. Of the 247 patients, 79 per cent were white and 21 per cent were Negro—about the same relative ratio as found in all patients admitted to this hospital. All but two of the patients studied were men. The occupations of the patients were divided as follows: skilled labor, 155; common labor, 44; active military personnel, 16; unemployed persons, 11; students, 9; salesmen and clerks, 5; professional persons, 4, and retired persons, 3. The skilled labor group represented about 30 different classifications, with the largest numbers of patients being found among truck drivers, farmers, painters, carpenters, mechanics and longshoremen.

The cause of the fracture was associated with an automobile accident in 41 per cent of the cases, with fighting in 33 per cent, with falls in 9 per cent, and with assaults, industrial accidents, gunshot wounds and miscellaneous causes in the remainder.

Some 81 per cent of the patients were discharged as having received maximum benefits from hospitalization; 17 per cent were discharged as absent without leave from the hospital.

The records revealed that 56 per cent of the 247 patients studied cooperated well in their treatment, 22 per cent cooperated poorly, and 22 per cent were uncooperative. Thirty-three per cent of the patients had been under the influence of alcohol at the time the trauma was received which resulted in the fracture. Sixteen per cent of the patients had a psychiatric history.

From the standpoint of the oral surgeon, the patients may be grouped into three large divisions. In the first group were the patients who exhibited aggressive, belligerent, impatient, emotionally unstable, immature characteristics. In most of these patients the trauma occurred during fighting, and they gave considerable trouble in the hospital; 40 per cent were of this type. The patient in the second group was typically intoxicated at the time the trauma occurred and gave difficulty in treatment during the first few hours or days of hospital treatment but subsequently gave little or no trouble; 29 per cent were of this type. A third group included those who were apparently the innocent victims of accidents or assaults and who cooperated well with the treatment; 31 per cent were in this group. The fact that a person had a psychotic background did not necessarily indicate that he would be uncooperative or would fail to complete his treatment.

The average length of stay as an inpatient for all patients studied was 22 days. Twelve case histories illustrate the various types of patients treated.

Veterans Administration Hospital, Houston, Texas

Intermittent parotid swelling due to ill-fitting dentures—an entity; its diagnosis and treatment

A. C. Furstenberg and Irving M. Blatt. *Laryngoscope* 68:1165-1181 July 1958

Obstructive sialodochitis is an entity caused by an inflammatory stricture at the papilla of the parotid duct, the result of trauma from improperly fitting partial or complete dentures. The condition appears to have a typical history, recognizable clinical manifestations, diagnostic roentgenographic features and characteristic histopathologic changes, all illustrated by three case reports. Each of the three patients—women 72, 58 and 46 years old, respectively—had been wearing upper and lower partial or complete dentures for many years. In each patient the upper denture was ill-fitting.

Clinical symptoms include diffuse parotid swelling with pain. Frequently, a feeling of pressure in the cheek occurs while the patient is eating. When salivary flow is stimulated by having

the patient chew on slices of lemon, the parotid gland may swell. Massage of the parotid region will elicit a sluggish flow of clear saliva from a hypertrophic parotid papilla. The cordlike, dilated Stensen's duct usually can be palpated along its buccomasseteric course. When the duct is probed, dilated segments in the duct alternate with strictures. A gritty sensation imparted to the probe by the hypertrophic and metaplastic duct epithelium may be mistaken for calcareous material.

Obstructive sialodochitis appears to be associated with the wearing of ill-fitting dentures which require the patient to masticate abnormally. As food is being chewed on one side of the mouth, the parotid papilla on the opposite side tends to be sucked mesially and bitten. Mastication is further altered when alveolar absorption occurs and allows the dentures to shift about as the patient chews.

When the parotid papilla is subjected to repeated trauma and inflammation, fibrous tissue proliferation and cicatrization occur. This interferes with normal salivary flow, and the ensuing pressure behind the stricture results in dilation of the gland duct; secondary bacterial infection supervenes with a diffuse inflammatory reaction along the course of Stensen's duct and with production of multiple inflammatory strictures. If a stricture in the secondary or tertiary ducts seals off a section of secreting acinar tissue, an inflammatory cyst may be formed.

The diagnostic features of obstructive sialodochitis are dilatation and stricture formation in the main salivary duct but without the terminal peripheral duct involvement seen in sialoangiectasis.

The disease is not a common disorder. Only three instances (2.7 per cent) were observed in 138 patients referred to the clinic for inflammatory lesions of the salivary glands. Obstructive sialodochitis should not be confused with nonobstructive sialoangiectasis. In the former there is no alteration in the terminal ducts or diminution in the volume of saliva secreted. In the latter, many of the terminal ducts are dilated, and the quantity of saliva secreted by the diseased gland is diminished.

The treatment for obstructive sialodochitis is surgical. Sialodochoplasty, a simple operation, is performed under local anesthesia (1 per cent solution of procaine hydrochloride) injected about the orifice of Stensen's duct. The papilla is grasped and amputated, and the open end of the duct is sutured with fine silk to the surrounding mucous membrane in a manner which exposes the duct to free communication with the oral cavity. Postoperatively, antibiotics and chemotherapeutic agents may be used for several days. Healing is prompt. Rapid regression of parotid swelling occurred in the three cases reported, and all have remained asymptomatic to date.

University of Michigan Medical School, Ann Arbor, Mich.

Internal fixation of jaw fractures with "Supramid" slings

F. Schedel. *Chirurg* 29:36-41 Feb. 15, 1958

Wires in internal fixation of jaw fractures have been employed for many years. This procedure, however, frequently causes posttreatment pain in the operative region even after the fracture is healed. In many instances the wire breaks because of electrochemical changes in the vicinity of the wire.

"Supramid" consists of nonmetallic fibers which are stable, elastic and do not cause any appreciable foreign body reaction.

The Supramid slings are introduced in a circular manner around the fractured jaw by means of a specially designed instrument which resembles a large curved Kelly clamp with holes in the tip of the clamp's beaks.

The Supramid thread is put through the holes of the closed clamp. The clamp is then placed around the fractured jaw until its tip becomes visible on the opposite side. The clamp is opened, and the thread grasped by another forcep. The clamp is withdrawn, permitting the thread to be tightened around the reduced fracture site. The jaw is notched to prevent postoperative slipping of the Supramid suture.

Roentgenograms taken preoperatively and postoperatively are presented to illustrate instances of successful fixation of jaw fractures with Supramid slings.

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Operative dentistry

The use of stainless steel pins to strengthen amalgam restorations

R. W. Wright. *Austral.D.J.* 3:369-370 Dec. 1958

A method of using stainless steel pins to strengthen amalgam restorations in large cavities and molars has proved to be satisfactory. The method is particularly useful where inlays otherwise would be needed.

In a large Class II amalgam cavity with a wide buccolingual opening and minimum retention form, retention of the restoration can be increased by inserting two or three pins into the floor of the cavity, at positions marked in Figure 1, left. The position of the pins is shown proximally in Figure 1, right, and laterally in Figure 2, left.

The pins are inserted to a depth of 2 to 3 mm. into the dentin, in holes drilled by a bur of the same gauge, and held securely in position by cement. The pins preferably should be roughened or threaded. The pins may be conveniently bent and may be in staple form inserted into the floor of the cavity at both gingival walls.

The steel pins strengthen the amalgam restoration much as high tensile steel rods or wires strengthen concrete.

The pins should be sufficiently long to penetrate the bulk of the amalgam but should not be exposed on the surface of the restoration.

No hot or cold reactions have been observed, nor is any clinical evidence available suggesting pain from galvanic action between the covered stainless steel wire and the amalgam. Dentin seems to tolerate the stainless steel pins without ill effect. The reinforcing of the amalgam with stainless steel wire seems to reduce expansion or bulk changes in the amalgam.

Austenitic stainless steel, unlike gold or gold alloys, will not undergo any alloying reaction with amalgams. However, in the presence of an electrolyte such as human saliva, small galvanic effects may occur between stainless steel wire and dental amalgam. This can be obviated by burying the stainless steel posts in the amalgam filling so that no saliva comes in contact with the stainless steel.

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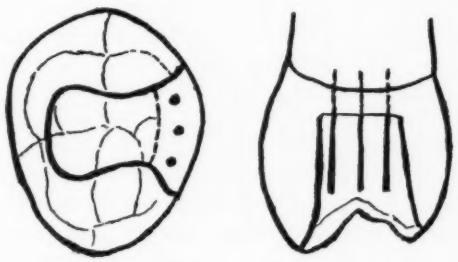

Figure 1

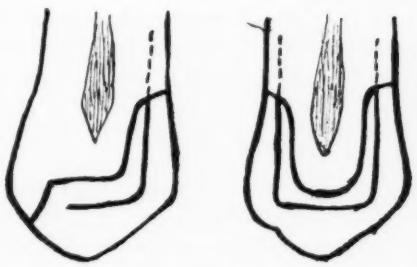

Figure 2

Diagram showing arrangement of stainless steel pins in cavity prepared for Class II amalgam restoration

Linings and their manipulation

J. J. Messing. *Schweiz.Mschr.Zahnhk.* 68:1088-1089 Nov. 1958

Among the cavity lining materials at present available, zinc phosphate cement is the most widely used. This material has adequate strength within the limit imposed by the normal packing pressure exerted during the condensation of amalgam; it sets quickly, does not stain the dentin and, when mixed correctly, adheres firmly and causes little reaction in the pulp. The pH of correctly mixed zinc phosphate cement, immediately after insertion, is in the region of 1.6, and this fact has often been thought to be the cause of pain in the preparation of deep and sensitive cavities.

The dental practitioner frequently is unable to distinguish whether the pain experienced by the patient after insertion of a filling has been caused by irritation due to specific properties of zinc phosphate cement or by trauma during cavity preparation. This uncertainty may be avoided by the use of zinc oxide-eugenol cement under zinc phosphate cement linings or by attenuating the acidic reaction of the cement through mixing equal parts of eugenol and phosphoric acid immediately before instrumentation.

Zinc oxide-eugenol cement has long been used as a means of allaying pulpal pain, and because of its sedative property this material should be used beneath phosphate cement in deeper cavities. Zinc oxide-eugenol cement, however, sets slowly and does not attain a sufficient degree of hardness for several hours. This makes an additional visit necessary during which the cement has to be trimmed and covered with a layer of phosphate cement.

The dentist may be justified if he prefers to place an amalgam restoration directly over a quick-setting zinc oxide cement lining in a comparatively small four wall cavity, but any attempt to pack an amalgam filling into a Class II cavity lined solely with zinc oxide cement will result in failure. The cement will tend to crumble and be extruded at the gingival margin, thereby producing a deficient filling.

If the pulp has been accidentally exposed during instrumentation and the cavity appears to be free from carious tooth substances and uncontaminated by saliva, pulp capping or a pulp dressing is indicated.

There are three materials which can be recommended for cavity lining: (1) zinc oxide-eugenol quick-setting cement; (2) calcium hydroxide, and (3) Thymozin. The latter may be used either as a dry powder or in the form of a suspension in methyl cellulose.

Zinc oxide-eugenol quick-setting cement has two uses as a lining material: as a protection against potential irritation of the pulp by phosphate cement and as a dressing covering an exposed pulp.

Calcium hydroxide can be insufflated on the dentin surrounding an exposed pulp. The excess should be removed peripherally with an excavator and a sufficient amount of phosphate cement should be flooded over the surface.

Thymozin is a commercial preparation which consists of a block of thymol and a jar containing minute pellets of zinc oxide particles which are fused together by thymol. This cavity lining material, used as a dressing, also acts as a pulp sedative, and its use will result in a complete amelioration of the symptoms.

There is no doubt that a restoration cannot be better than the sum of the components in its construction. A perfect filling, therefore, must have a hard, well-placed cavity lining overlying a healthy pulp, and must be sufficiently thick to endure the force of mastication under all conditions.

Any excess of cement in cavity preparation makes the restoration weaker and less retentive.

In Class II cavities the cement lining covering the axiopulpal region should be sufficiently rounded to prevent the concentration of stresses resulting from sharp angle fractures in the restoration.

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Endodontics

The use of gold leaf in endodontics

Samuel Luks. *New York State D.J.*
25:61-66 Feb. 1959

Although the ideal root canal filling material has yet to be found, gutta-percha remains the material of choice despite some objectionable properties that contribute to occasional failures in endodontics. One unfavorable characteristic of gutta-percha is shrinkage, which may occur any time after filling, particularly in large canals; another is difficulty in manipulation. As a filling material in root canals, gutta-percha is used in combination with either chloroform, oil of eucalyptus or a root canal sealer. All these agents alter the desirable physical properties of gutta-percha unfavorably. Chloroform causes the gutta-percha to swell and then to shrink with evaporation of the chloroform. Furthermore, the gutta-percha is rendered more soft and plastic.

The desirable physical properties of gutta-percha can be preserved by wrapping the gutta-percha point in gold leaf. An unlimited number of layers of gold leaf can be added to alter the size of the gutta-percha point to produce in-between sizes of points not available from the manufacturer.

Two varieties of gold leaf may be used. One is shoder gold, the other is xx-23 carat gold leaf. Both are supplied in booklets, with each sheet of gold leaf measuring about 3¾ inches square. The operator should experiment with both types.

The following technic is used:

1. A gutta-percha cone is selected and fitted accurately to the apex of the root to be filled. A roentgenogram is taken to verify the accuracy of the selection.

2. Other gutta-percha points of smaller taper are selected, and immersed in distilled water. The booklet of gold leaf is opened. The initial gutta-percha point is removed from the distilled water and, while still wet, is placed on the edge of the gold leaf and rolled in one direction. Because of its adhesive properties, the gold leaf will adhere firmly to the gutta-percha. Several layers of gold leaf may be added without increasing materially the dimensions of the point.

3. A root canal sealer is mixed. With the aid of a paper point, the walls of the canal are painted; any excess sealer is blotted up from the canal with dry paper points.

4. The initial gutta-percha point, wrapped in gold leaf, is delivered to its predetermined position. Additional points, similarly wrapped in gold leaf, are wedged alongside the first point to lock it in position. The excess gutta-percha protruding from the crown of the tooth is severed with a hot instrument and the short ends are packed into the orifice of the canal.

5. Condensation for obliteration of the lateral spaces is accomplished with a newly designed set of four pluggers (Fig. 1) whose tapered shafts are designed to succeed each other. Each plugger

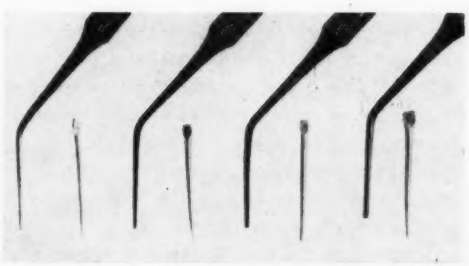

Figure 1 Newly designed set of four pluggers with tapered shafts which succeed each other accurately. Each instrument creates a space to accommodate a gutta-percha point of similar size and taper

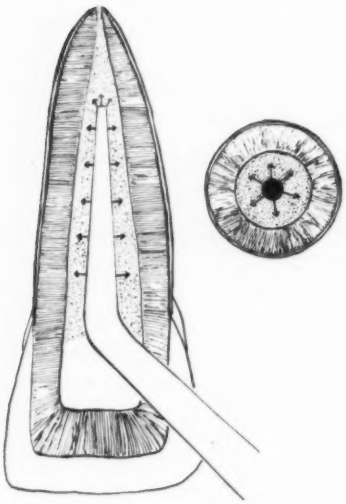

Figure 2 A diagrammatic view of the no. 1 plugger inserted through the center of gutta-percha. Arrows indicate the direction of force from the instrument's tapered shaft against the mass of gutta-percha

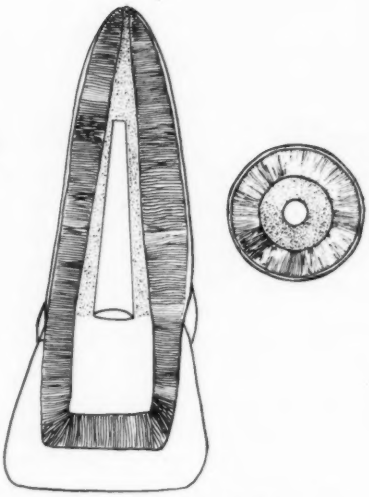

Figure 3 The no. 1 plugger has been withdrawn by rotation on its axis, leaving a space ready to receive a gutta-percha point of similar taper, or ready for further enlargement by the no. 2 plugger

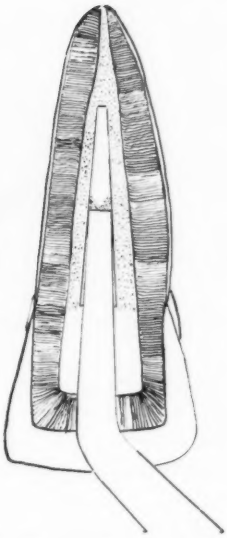

Figure 4 The no. 2 plugger has been introduced into the space left by the no. 1 plugger. The instrument enters the space freely and begins to collect gutta-percha on its flat end for delivery toward the apex

on removal will leave a space to accommodate a gutta-percha point of similar taper.

6. The no. 1 plugger is selected. Its tip is placed in the center of the gutta-percha at the orifice of the canal. With firm, gentle, continuous pressure the instrument is delivered toward the apex (Fig. 2). When the force being used seems excessive, the pressure is removed, the instrument is rotated on its axis and withdrawn. A space will have been created equal to the taper of the plugger (Fig. 3).

7. The no. 2 plugger is used to enter the space created by the no. 1 plugger. As the instrument is delivered apically, it will peel off gutta-percha from the walls of the previously created space on the flat end of the instrument and carry the gutta-percha ahead for apical condensation (Fig. 4).

8. If the size of the canal requires further filling, the procedure is repeated with the no. 3 plugger and the no. 4 plugger.

This technic protects the physical properties of the gutta-percha and reduces overfilling to a minimum. The fillings are of uniform quality.

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Effects of the topical application of a vasoconstrictor and a vasodilator on the capillary circulation of the dental pulp

D. Vincent Provenza and W. Robert Biddington. *Oral Surg.,Oral Med.& Oral Path.* 11:1269-1277 Nov. 1958

This study was undertaken to determine the possibility of effecting changes in the caliber of the lumens of muscle-bearing capillaries in the dental pulp by the topical application of a vasoconstrictor and vasodilator, and to demonstrate the innervation of the muscular components of the metarterioles and precapillary sphincters.

Teeth with healthy, vital pulps were extracted for reasons other than pulpal involvement, placed in 10 per cent Formalin for one to two weeks and the pulps extirpated and placed in 10 per cent Formalin for an additional 24 hours. The pulps then were washed in tap water, dehydrated, embedded, and sections made. The Lillie-Pasternack method (1936) was used to demonstrate the

muscle components of capillaries, and the Bodian method (1936) was used to demonstrate nerve endings. The following data were obtained:

1. Although the larger nerve trunks are intimately associated with the accompanying blood vessels in the radicular pulp, the smaller nerve fibers found in the coronal pulp need not be associated with vessels of smaller caliber. In the arterioles the accompanying nerve was observed to send off branches at varying intervals, the endings of which terminated in knotted fibrillar processes in the muscle cells of the media. In the metarterioles and precapillaries a similar arrangement was noted, by which the nerve fiber which traveled parallel to the long axis of the vessel sent off smaller branches in the vicinity of the muscle sphincter, also terminating in a knotted fibrillar process encompassing the cell. Although nerve fibers were observed to follow the course of the true capillaries, nerve endings were not observed innervating the endothelial walls.

2. Vasodilation of all muscle-bearing components of the vascular system of the dental pulp (radicular and coronal) can be effected by the topical application of nitroglycerin.

3. Vasoconstriction of the muscular vessels of the pulp can be induced by the topical application of epinephrine.

4. Since vascularity may be controlled by the use of certain drugs, there exists the possibility that such drugs may be of therapeutic value in the treatment of certain pulpal diseases.

The data obtained in this study indicate that further investigation is warranted.

Baltimore College of Dental Surgery, University of Maryland, Baltimore, Md.

Initial reactions of the pulp to cortisone acetate

Julio C. Turell, Nair Areco
and E. Casas Morales. *Odont.Uruguaya*
12:404-410 Jan.-Feb. 1958

The chance of preserving a tooth with an accidentally exposed but healthy pulp may be improved by keeping the exposed part of the pulp covered with a paste. This possibility was investigated at the School of Dentistry of the University of Uruguay in Montevideo.

Several animal teeth and 16 healthy human teeth (extracted for orthodontic reasons) were used in the investigation. The exposed pulp was covered by a paste consisting of 6 parts anhydrous calcium chloride, 1 part cortisone acetate, and anhydrous glycerine in sufficient quantity. Anhydrous glycerine was selected as a vehicle, and calcium chloride as a remedy to reduce edema, the usual sequelae of trauma to the pulp. Both substances have dehydrating properties. Calcium chloride exerts no caustic action. Water as a solvent liberating hydrochloric acid would have resulted in corrosion of living tissue.

A cotton plug was used to separate the paste from the oxyphosphate cement. The teeth were filled with amalgam. The treated teeth, and other teeth serving as controls, were extracted after they had been kept in the mouths of animals and patients for periods ranging from 20 to 45 days.

The patients were examined periodically. None of the patients treated with the cortisone acetate paste showed symptoms of pulpal disease, whereas persons serving as controls (whose teeth were treated with calcium hydroxide) showed hyperemia of varying degrees.

After extraction, all teeth were studied histologically to determine the condition of the pulp. It was observed that the ability of the pulp to react defensively was increased by the effect of the paste. An abundant formation of new fibrous connective tissue had taken place, and this tissue had been transformed into a dentinoid substance within 30 to 45 days after treatment.

Because the cortisone acetate in the paste must have been absorbed within a comparatively short time (from 60 to 80 hours), it can be concluded that the cortisone acetate paste—if permitted to cover the exposed pulp long enough to prevent the development of inflammation, but not long enough to impair the defensive reactions of the pulp—possesses properties which increase the chances of preserving teeth with accidentally exposed but healthy pulps.

Although the number of animal and human teeth studied was small, the preliminary findings justify further investigations.

Las Heras 1925, Montevideo, Uruguay

Periodontics

Gingival hyperplasia caused by "Dilantin" medication

W.A.M. van Du Wast. *Acta Med.Scandinavica* 153:399-405 Jan. 1958

"Dilantin" (5,5-diphenylhydantoin sodium), an anticonvulsant drug, has proved useful in the control of epilepsy.

About 40 patients treated with diphenylhydantoin sodium (100 mg. four times a day) developed a hyperplastic gingivitis. Edentulous patients were found to be free of any inflammation of the gingival tissue, even though the maximum dose of 600 mg. had been administered.

In this investigation, 23 patients treated with diphenylhydantoin sodium and exhibiting gingival hyperplasia were used. Biopsies were made of the hyperplastic tissue and the marrow of oral bones. Morphological blood examinations were completed in all patients.

Histologically, both the epithelium and the submucosa showed hyperplastic changes with a dense infiltration of uninuclear cells most of which were plasma cells. These modified lymphoid cells with a homogeneous basophilic cytoplasm produced antibodies. An increase of the blood gamma globulin level was observed in 20 of the 23 patients. The bone marrow biopsies and the morphological blood examinations showed no abnormalities.

It was concluded that the gingival hyperplasia, occurring after administration of diphenylhydantoin sodium, was not a toxic but an allergic reaction to that drug. This conclusion was based on the fact that the group to which diphenylhydantoin sodium belongs possesses a great sensitizing capacity and frequently causes other side effects such as dermatitis, purpura, agranulocytosis and eosinophilia, all of which are due to sensitization.

Further studies are planned to determine the exact mechanism of the hyperplastic response of the gingival tissue to diphenylhydantoin sodium.

Tryckerigatan 2, Stockholm 2, Sweden

Antihistamines and diphenylhydantoin-induced gingival hyperplasia

F. C. Sturmer, Jr. *New England J.Med.* 259:485-486 Sept. 4, 1958

Within the last years, two reports have appeared in the *New England Journal of Medicine* concerning the effectiveness of antihistamines as a form of therapy for the gingival hyperplasia frequently seen in those being treated with diphenylhydantoin sodium for convulsive disorders.

The present report is on a series of 28 patients to whom antihistamines were given for treatment of gingival hyperplasia thought to be secondary to the administration of diphenylhydantoin. The patients ranged in age from 4 to 32 years, and had been taking antihistamines for from 17 to 108 months. Dosages of the anticonvulsant drug ranged from 50 to 400 mg. daily. The degree of gingival hyperplasia was judged to be moderate in 6, moderately severe in 9 and severe in 13.

Chlorprophenpyridamine maleate was given to 16 patients in doses of 4 mg. every six hours. Tripelennamine hydrochloride was used in five patients in doses of 50 mg. every six hours. Diphenhydramine hydrochloride was given to five patients in doses of 25 mg. every six hours and to two of the smaller patients in a dose of 10 mg. every six hours. Results were evaluated by comparison of color pictures of the gingivae taken before the start of the drug therapy, and of those taken one day before the drugs were discontinued three months later.

No difference in the degree of hyperplasia after therapy was noted in a single patient.

Harrisburg Hospital, Harrisburg, Pa.

Gingivitis produced by calculus accumulation: report of case

H. Schwarzkopf. *Bl.Zahnhk.,Zürich* 19:135 Oct. 1958

The patient, a 64 year old woman, consulted her physician and complained of a hard swelling on the right side of the upper jaw, extreme halitosis, painful inflammation of the gingiva and repeated hemorrhage in the oral cavity.

The patient was referred to the author for dental examination with the comment that the condition showed all the symptoms of a tumor of toothlike structure (odontoma).

Dental examination revealed the presence of a large accumulation of calculus in an edentulous mouth. The mass reached from the right cuspid to the second molar region. It reached to the midline of the palate and distally, to the region of the maxillary tuber. On the borders of the calcareous deposit, the gingival tissue appeared ulcerated and extremely swollen. The lightest touch produced hemorrhage.

After roentgenographic examination, the accumulated calculus was surgically removed under local anesthesia.

An upper complete denture was inserted which the patient wore for about one year without complaint. After 14 months, the patient appeared at the dental office with the same complaints. Examination revealed that below the buccal part of the denture, a 3 cm. thick layer of calculus had accumulated producing an asymmetrical appearance of the face. After removal of the abnormal concretion, obviously caused by a hyperfunction of the right parotid gland, the patient was referred to the otorhinolaryngologic clinic for further treatment.

Weisskreuzstrasse 6, Hannover, Germany

Chronic marginal gingivitis: its treatment in dental practice

Horst Leonhardt. *Kartei zahnärztl.Praxis* 9:2-3 Nov. 1958

A frequent complaint of middle-aged patients is repeated bleeding from the gingival tissue. The gingivae appear congested and extremely soft. Supragingival calculus is almost always present in varying amounts, and when the inflammation which initially involves only the gingivae progresses to periodontal disease with pocket formation, the involved interdental papillae are dark red and flattened. This form of gingivitis usually is caused by a chronic vitamin deficiency (vitamin A, B complex or C).

A second form of gingivitis with similar symptoms is regionally limited and is probably caused by tissue reaction to foreign bodies such as crowns, bridges and fillings.

A third form of gingivitis occurs as a sequela of damage to the general organism (infection, anemia, diabetes insipidus or diabetes mellitus and poisoning, especially plumbism.

Treatment consists of cleaning the involved teeth and gingival tissue with a 10 per cent solution of peroxide. The causative factor or factors then should be determined. Hypovitaminosis must be counteracted by enriching the diet with compact doses of the vitamins lacking. If foreign bodies cause the gingival inflammation, irritating calculi, crowns, bridges or fillings should be removed. The thoroughly cleaned gingival tissue then is treated topically with sulfonamide powder.

For treatment at home, the following preparation, used as tooth powder, is prescribed:

Bismuth subsalicyclate	0.5 Gm.
Tannic acid	1.0 Gm.
4-Homosulfanilamide hydrochloride (Marfanil)	0.5 Gm.
Menthol	0.5 Gm.
Saccharin	0.3 Gm.
Calcium carbonate	50.0 Gm.

This powder should be used with a soft toothbrush (not nylon) to promote constant cleanliness of the teeth and the involved oral tissues. The toothbrush should conform to the individual requirement in size and shape, flexibility and elasticity.

After each treatment, a rinse containing 1 drop of sodium fluoride in a glass of water is recommended.

Patients in whom gingivitis is associated with a systemic disease should be referred to a physician because treatment at the dental office can correct only the localized manifestations and not the debilitating systemic influences.

The importance of oral hygiene must be emphasized. Proper and regular toothbrushing will prevent deposition of calculus, accumulation of detritus and will increase the regenerative ability of the gingiva. Together with periodic dental prophylaxis, such procedures will aid in the maintenance of health of the teeth and their investing tissues.

Hofstallgasse 2, Salzburg, Austria

Periodontics and operative dentistry: II. Restoration of contours

Jorge Horacio Romanelli.
Rev.A.odont.Argentina 46:133-144 May 1958

The natural crowns of all human teeth present a series of curves which serve to protect the interproximal gingival tissue and the gingival margin from injuries. The vestibular cervical convexity of all teeth, the palatal or lingual convexity of bicuspids and molars and the cingulum of the anterior teeth protect the gingival margin, whereas the interdental tissue is preserved by the proximal curves.

So important and essential are these contours for the health of the investing tissues that their destruction or modification by placement of prosthetic restorations with inadequate contours must be discouraged.

Distortion of contour by restorations that fail to respect the natural convexity of the teeth frequently leads to the development of chronic gingival lesions, retractions, hypertrophies, discolorations and hemorrhages. These symptoms, however, will disappear when the distortion of contour is corrected. Correct contour assists in maintaining and protecting the health of the gingiva; an excessive contour causes the investing tissues to lose their tone and may result in the formation of pockets causing chronic inflammation of gingival tissues. From these facts, it can be assumed that many restorations—fillings, crowns, bridges, inlays, and so forth—prove to be failures because they lack the proper contour. These failures are caused by the lack of consideration of the specific periodontal condition present rather than by the lack of technical skill in preparation and instrumentation.

Deficient restoration of the vestibular cervical contour leaves the gingiva exposed to alimentary trauma which causes gingival retraction and root exposure.

Excessive vestibular or palatal convexity deprives the soft tissues of alimentary stimulation and the normal cleansing action of mastication. When the proximal contours are distorted, either by deficiency or excess, the interdental tissues are affected and the risk of primary or secondary caries is increased. Defective contours of the proximal surfaces, especially of anterior teeth, can be observed even if the color of the restoration harmonizes with that of the teeth.

Arenales 2008, Buenos Aires, Argentina

Effect of the administration of steroid hormones on the gingival tissues

Samuel Krohn. *J.Periodont.* 29:300-306 Oct. 1958

The teeth and gingival tissues of 100 patients receiving significant amounts of ACTH or another adrenocorticoid hormone for various systemic diseases were examined and compared with the teeth and gingival tissues of 101 patients being treated in the same five hospitals for essentially the same diseases but not receiving any of these drugs. The following conclusions were reached:

1. Steroid therapy does not produce any gingival reaction.

2. The extent of the inflammatory response of the gingival tissues, and the diagnosis of periodontal disease, were more dependent on the age and oral status of the patient than on whether the patient had been receiving steroids.

3. No significant differences were seen between the effect on gingival tissue of ACTH and steroids associated with the adrenal cortex.

4. When the patients receiving steroids were divided into groups receiving the drug for two months or less and those receiving the drug for a longer period of time, it was observed that the patients receiving steroids for a longer period generally were in the older age groups, and that the patients receiving steroids for the shorter period had the poorer oral status and a more severe inflammatory response.

5. In patients with a diagnosis of rheumatoid arthritis, 57 per cent of the patients receiving steroids had periodontitis, and 55 per cent in the control group had periodontitis.

6. In a control group of patients with osteoarthritis and a steroid group with eye disease, the findings of periodontal disease could be explained on the basis of age and oral status.

7. Other categories of disease present in this study did not demonstrate significant differences between the experimental and control groups.

1009 David Broderick Tower, Detroit, Mich.

Orthodontics

Growth of the facial and cranial skeleton: the zoological viewpoint

Hermann Wurmbach. *Fortschr.Kieferorthop.* 18:4-22 July 1957

Growth, in its biological and zoological meaning, is not identical with cell division. Growth is effectuated by the accumulation of water, living substance and specific differentiation. Cell division itself does not produce growth.

The brain, for instance, exerts a radially directed hydrostatic pressure. The division of brain cells takes place during the early months of embryonic life. The growth of brain cells occurs during later embryonic periods and is completed at the time of puberty.

The growth of the cranial vault is completed at a time in which other parts of the facial skeleton, including the jaws, are still developing. If the hydrostatic pressure exerted by the brain is abnormally strong, as in hydrocephalus, increased accumulation of fluid in the cranial vault, enlargement of the skull, prominence of the forehead and atrophy of the brain occur. If the hydrostatic pressure is abnormally weak, anencephalia develops which is characterized by the absence of the cerebrum, cerebellum and flat bones of the skull.

The epithelial cells divide and grow throughout the entire life. They exert no influence on the growth of the face and do not produce hydrostatic pressure.

Other cells and tissues of the maxillofacial region are of mesenchymal origin and form the connective tissues, the blood and lymphatic vessels. They are able to produce hydrostatic pressure by secreting hyaluronic acid which swells by water uptake and forms an elastic cushion against pressure.

By a combination of hyaluronic acid with collagenous fibers the pulp of teeth, vitreous humor, the umbilical cord and synovial fluids are formed and also the anlage of connective tissues, cartilages, bones and muscles.

Growth is possible only by the combination of hydrostatic pressure producing mucopolysaccharide (hyaluronic acid) or chondroitin-sulfuric acid with albuminoid which forms collagenous, dentinal, dentinogenic, elastic, enamel and muscle fibers. The linear elements of muscular tissue (muscle fibers) form the facial outline by limiting the hydrostatic pressure.

The mesenchyma is of main importance in growth and development of the embryo; in later stages it forms the pulp, regenerates oral tissue and sometimes is one of the causative factors in acromegaly.

Cartilage, by forming certain parts of the cranial and facial skeleton, takes over the task of producing hydrostatic pressure and molding the lower jaw and the elastic connective tissue layers of the tongue.

Figure 1 Experimentally produced achondroplasia in chick embryos (insulin injection)

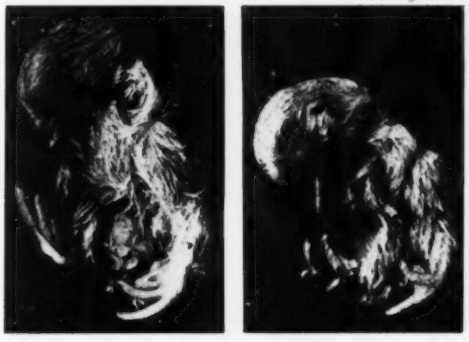


Figure 2 Experimentally produced dyschondroplasia in chick embryos (sulfonamide injection)

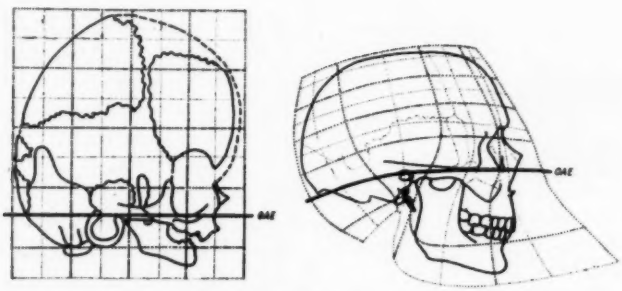


Figure 3 Skull of a human fetus compared with the skull of an adult. OAE = Ear-eye plane

Figure 4 Above: Teleroentgenogram of the head of a patient with acromegaly. Right: The face of a patient with cretinism

Figure 5 Theromorphic primordial development of the face. Left: Warramunga man (Australia). Center: Dravidian man (India). Right: Young male gorilla

In many animal species and also in man, an abnormal decrease in cartilage growth causes achondroplasia and dyschondroplasia. These usually hereditary abnormalities can be reproduced experimentally. Landauer succeeded in producing imperfect ossification within the cartilage of bones, thereby creating dwarfism, by treating chick embryos with insulin. Other biologists injected sulfonamides, boric acid or other compounds which interfered with the carbohydrate metabolism in experimental animals, resulting in similar abnormalities.

The steroids of the adrenal glands also inhibit normal cartilage growth, thereby producing the "moonshaped" face, one of the characteristics of Cushing's syndrome and myxedema.

Even at a comparatively advanced age, the overfunction of the anterior pituitary gland in acromegaly may renew cartilage growth. This renewed growth often results in the formation of protruding mandibles.

The orthodontist seldom has the opportunity to use environmental factors influencing the growth of the facial and cranial skeleton. There is still a great need for knowledge of the growth of the human face and skull and for additional experience in the applicability of drug therapy in the orthodontic treatment of patients with defective and abnormal development of the face or the jaws.

Poppelsdorfer Schloss, Bonn, Germany

Development of the facial skeleton and its disturbances

Gustav Korkhaus. *Fortschr.Kief.Ges.Chir.* 4:13-32, 1958

The main sites of skeletal growth in the facial parts of the human skull are: (1) the synchondroses of the cranial base; (2) the sutures of the middle facial framework, and (3) the condylar cartilages of the mandible.

Also, a gradual growth of the facial skeleton by a coordinated surface deposition and resorption of osseous tissue begins in the seventh year of life.

Interruption of the normal maxillofacial growth, resulting from a premature ossification of the synchondroses of the cranial base, produces a corresponding retardation of the skeletal growth of the middle face, especially observable in oxycephaly, lipochondrodystrophy (gargoylism), cleidocranial and craniofacial dysostoses as well as in endocrine disturbances such as cretinism, myxedema and mongolism. Similar changes in maxillofacial development may be caused by most types of avitaminosis, especially rickets. In all these instances the facial skull has a "compressed" appearance.

The sutures of the skeleton of the middle face are so arranged as to permit growth and development simultaneously at the horizontal and vertical planes. Growth of the cartilages of the nasal septum plays an important role in the development of this region of the facial skull.

Serial roentgenograms permit an insight into the steady—although probably intermittent—growth of the facial skeleton during postnatal life.

Apart from the developmental factors, the effects of functions such as mastication, respiration and speech also play a significant part in modifying the form of the skeleton of the middle face and the maxillary region. The development of the lower jaw is controlled by the hyaline cartilages of the condyloid process. The gradual growth is closely related to the formation of the middle facial skeleton. Failure of mandibles to develop normally may be the result of deficient or excessive growth activity in the maxillofacial region.

The best examples of disturbances in the development of the facial skeleton are (1) congenital or acquired micrognathia associated with retrusion of the lower jaw and overbite, and (2) acromegalia associated with prognathism.

Zitelmannstrasse 16, Bonn, Germany

Prosthetic dentistry

Complete lower denture with tantalum ligature anchorage

L. Caposi and L. Benagiano.
Deut.zahnärztl.Zschr. 11:960-963 Aug. 1957

Complete lower dentures often require major adjustments of the denture base after insertion.

At the George Eastman Dental Institute in Rome, Italy, an improved technic is used to overcome postinsertion difficulties which are discouraging to the dentist and the patient. An anchorage for removable complete lower dentures is obtained with surgically inserted tantalum wires. These tantalum ligatures have proved especially successful in the prosthetic treatment of severe atrophy of the lower jaw. The anchorage, surgically inserted into the region between cuspids and first molars (bicuspids are temporarily omitted) guarantees an adequate functional recovery. This technic can be used to obtain fixation and immobilization of fractures occurring in edentulous lower jaws.

The procedures are as follows:

1. Under local or regional anesthesia, an incision is made on each side, about 2 cm. long. The incision begins at the cuspid region and reaches the region of the first molar.

2. The mandibular bone is encircled with a 1 mm. wire of tantalum which is passed around the bone with a long hypodermic needle.

3. The tantalum wires are brought into direct contact with the mandibular bone in a manner which permits the projection of the ends from the mucous membrane.

4. A loop is formed on each side, at the space reserved for the bicuspids, about 1.5 mm. in diameter. Two anchorage points are thereby created into which the denture can be easily inserted and from which it can be removed without difficulty.

After surgery, the patient should receive antibiotic treatment for about five days. If the healing process is uneventful, the sutures can be removed

Figure 1 Encircling of the mandibular bone with tantalum wires. Passing the tantalum wire around the bone with a long hypodermic needle

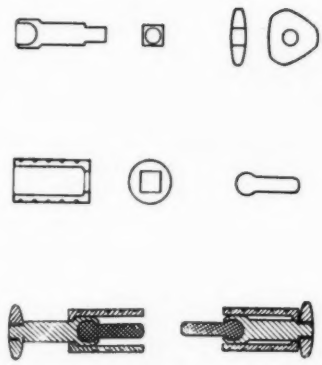


Figure 2 The boltlike attachment and its parts

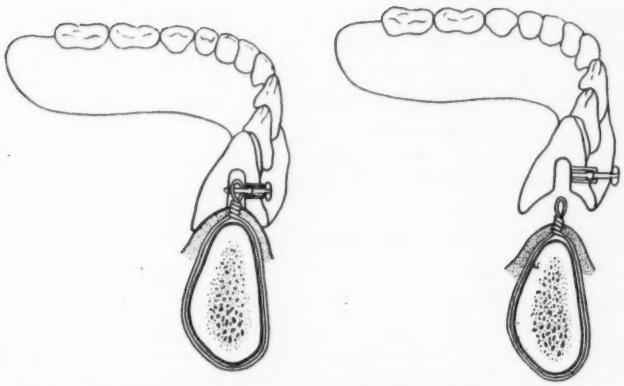


Figure 3 The tantalum ligature anchorage. Left: Locked position. Right: Open position.

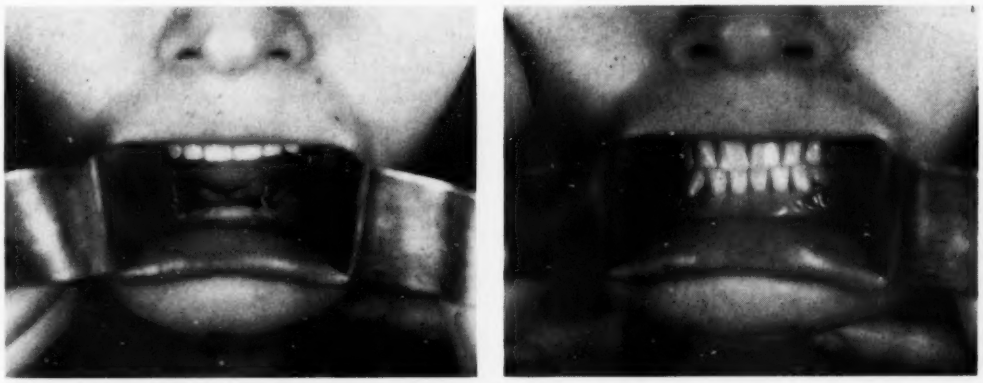


Figure 4 The tantalum ligature anchorage inserted. Left: Before positioning the denture. Right: After positioning the denture

Figure 5 Roentgenogram of the inserted complete lower denture with the tantalum ligature anchorage

after one week. The construction of the completed denture can then begin.

The inserted tantalum ligature anchorages must comply anatomically and topographically with the condition of the lower jaw.

After a period for adaptation of tissue—about two weeks—corrections, if necessary, can be made. The denture is inserted into the loops of the ligature anchorage by using a boltlike device which is attached to the ligature with a layer of self-curing acrylic resin.

The working of the ligature anchorage should be studied during masticatory function for about two weeks. The temporarily omitted bicuspids then can be added to the denture.

During the last three years, complete lower dentures with tantalum ligature anchorages have been inserted in 25 patients between 48 and 75 years old. There were no failures. The anchorage provided a dependable retention for the denture. There were no unfavorable or systemic reactions.

Via Quintino Sella 8, Rome, Italy

Pulp protection and cementation in restorative dentistry

Harold Berk and Alvin A. Krakow.
Alpha Omegan 51:95-100 Sept. 1958

Cementation has a dual function. It serves as an adjunct to the frictional retention of the restoration, and, by occupying the space which exists between the restoration and preparation, it physically prevents penetration of saliva, bacteria and digestive by-products which would cause putrefaction and decay.

Temporary cementation of temporary restorations is necessary to protect the prepared teeth against mechanical, chemical and thermal irritations until the permanent restoration is fabricated. The temporary restorations most commonly used are made of self-curing acrylic resin. Usually these are cemented to place with a quick-setting temporary cement which has a zinc oxide-eugenol base. There is little or no harm done to the pulp when this type of cement is used. However, a difficulty arises from the physical nature of the resin. Because of its resilience, dimensional changes occur during mastication. Furthermore, its coefficient of expansion and contraction is far greater than that of the tooth substance. Also, the eugenol in the temporary cement has a softening effect on the acrylic resin. As a result of these factors, the seal between the temporary cement and the tooth may be broken. This problem can be overcome with either a gold thimble acrylic restoration or a copper band acrylic restoration. In both instances, success is attributed to the added frictional retention and stability obtained by the use of the metals. The gold thimble acrylic restoration is best because it allows frictional retention over the entire surface of the preparation.

A cement for a permanent restoration must protect the pulp, contribute to mechanical retention and meet the problem of esthetics in translucent restorations.

To protect the pulp from chemical irritation and to eliminate pain when cementing restorations, a liquid suspension of calcium hydroxide in aqueous methyl cellulose can be used. When used as a liner, this preparation is a mild irritant which stimulates the formation of secondary dentin and has beneficial effects on the pulp. Calcium hydroxide neutralizes free acids. It is bactericidal and provides surface sterilization.

A liquid suspension of calcium hydroxide in aqueous methyl cellulose fulfills most of the requirements of an ideal liner. This agent is applied easily. Because of its consistency, a thin layer can be spread readily over the prepared tooth with any convenient applicator such as a camel's hair brush. It is dried quickly by a gentle stream of air creating a clearly visible chalk white film. Because the agent is water miscible, any excess around the margins can be removed easily by wiping with a moist pellet of cotton. Mechanical removal from the margins can be accomplished with an explorer or similar instrument without flaking it away from the rest of the preparation. Its average film thickness of about 0.003 mm. is so negligible that it will not interfere with the seating of restorations.

Calcium hydroxide in aqueous methyl cellulose is available both as a liquid and a paste. The liquid is used primarily as a liner; the paste is used primarily for pulp capping.

School of Dental Medicine, Tufts University, 136 Harrison Avenue, Boston, Mass.

Pedodontics

A simple appliance for the elimination of thumb sucking

Morris N. Capouya. *J. Alabama D.A.* 43:9-10 Jan. 1959

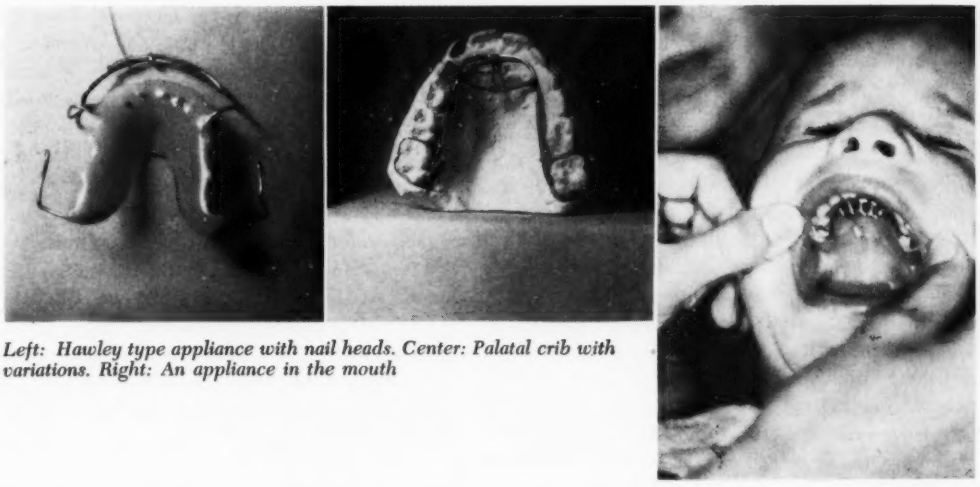
If thumbsucking is stopped or controlled when the patient is four to seven years old, no great amount of damage is done to the position of the permanent teeth. Usually, an explanation to the patient of the effect of thumbsucking will result in a cooperative attitude.

The thumbsucking habit in most patients may be eliminated with a simple appliance consisting of a palatal crib with a downward convexity, types of which are shown in the illustration.

Construction of these appliances is simple. Preformed crowns, full or band type, are fitted to deciduous second molars or permanent first molars. A compound impression is taken with the bands in place. A stone model is poured, and .032 or .036 chrome alloy wire is adapted and held in place in the anterior region with sticky compound. Soldering is done with 14 carat or 16 carat gold solder and a chrome alloy flux. Such an appliance, in place in the mouth, is illustrated below.

The appliance can remain in the mouth for a period of six months or less, depending largely on the response of the patient.

229 South Perry Street, Montgomery, Ala.



Left: Hawley type appliance with nail heads. Center: Palatal crib with variations. Right: An appliance in the mouth

Therapeutics

Identification guide for solid dosage forms

John J. Hefferren. *J.A.M.A.* 169:479-484
Jan. 31, 1959

The need to identify rapidly an unknown tablet or capsule frequently occurs in a wide variety of circumstances. In most instances, the qualitative chemical analysis followed by confirmation tests is a long and difficult task. The time factor, coupled with the limited quantities of the unknown drug at hand, makes the identification laborious and often impossible.

Methods to aid in identification have involved direct comparisons of the unknown drug with pictures of known products or with authentic samples. Such methods may suggest the identity of the unknown drug or eliminate a few possibilities, and they are, therefore, of some value in identification but are certainly limited in scope.

As a possible aid in drug dosage identification, the feasibility of a preliminary screening method, based solely on the physical characteristics of solid forms such as tablets and capsules, was investigated at the Chemical Laboratory of the American Medical Association. Examination of a number of commercial tablets and capsules made it evident that there were sufficient differences in the physical characteristics to suggest reliance on them in identification or screening procedures. To test these initial observations, 100 products were examined and classified according to their physical characteristics. Because the results were encouraging, the investigation was extended to 500 products. The samples were not selected according to any use-frequency statistics but on the basis of a representative cross section of the physical characteristics of tablets and capsules. Extension of the coding system to include other solid dosage forms such as suppositories is planned.

The dosage identification guide (Fig. 1) accommodates all the tablet and capsule preparations on the American market. It contains three main categories: (1) tablets; (2) soft gelatin capsules, and (3) hard gelatin capsules. In each of the categories the individual characteristics are listed under the headings: coating, shape, coloring, contents, markings, scoring and size.

The shapes of the various tablets and capsules used in the dosage identification guide are illustrated in Figure 2.

All measurements of tablets and soft gelatin capsules were made with a vernier calipers reading to 0.1 mm. The size of the hard gelatin capsules was determined by reference to the chart of standard capsule size (Fig. 3).

The 500 products used in the pilot study can be broken down by size and shape. The sizes are listed in the table (Fig. 4). The breakdown by shape (Fig. 5) shows a variety of tablets and capsules, ranging from the unusually shaped, well-marked products to the familiarly shaped, unmarked products. The unmarked categories (indicated by arrow) can be further differentiated only on the basis of their size. This tablet group—uncoated, round, biconvex, white, unmarked and scored ½—consists of 28 products.

With the identification guide, the essential and generic characteristics of an unknown drug can be established with relative ease.

It is planned that all data obtained from coding the physical characteristics of tablets and capsules will be organized and published together with the dosage identification guide, color reference chips and instructions for use. The first edition, containing 5,000 listings, will appear in about one year. Supplements and new editions will be published regularly to include new products and those appearing with changed physical characteristics. Finally, all commercial drug products obtainable will be listed.

535 North Dearborn Street, Chicago 10, Ill.

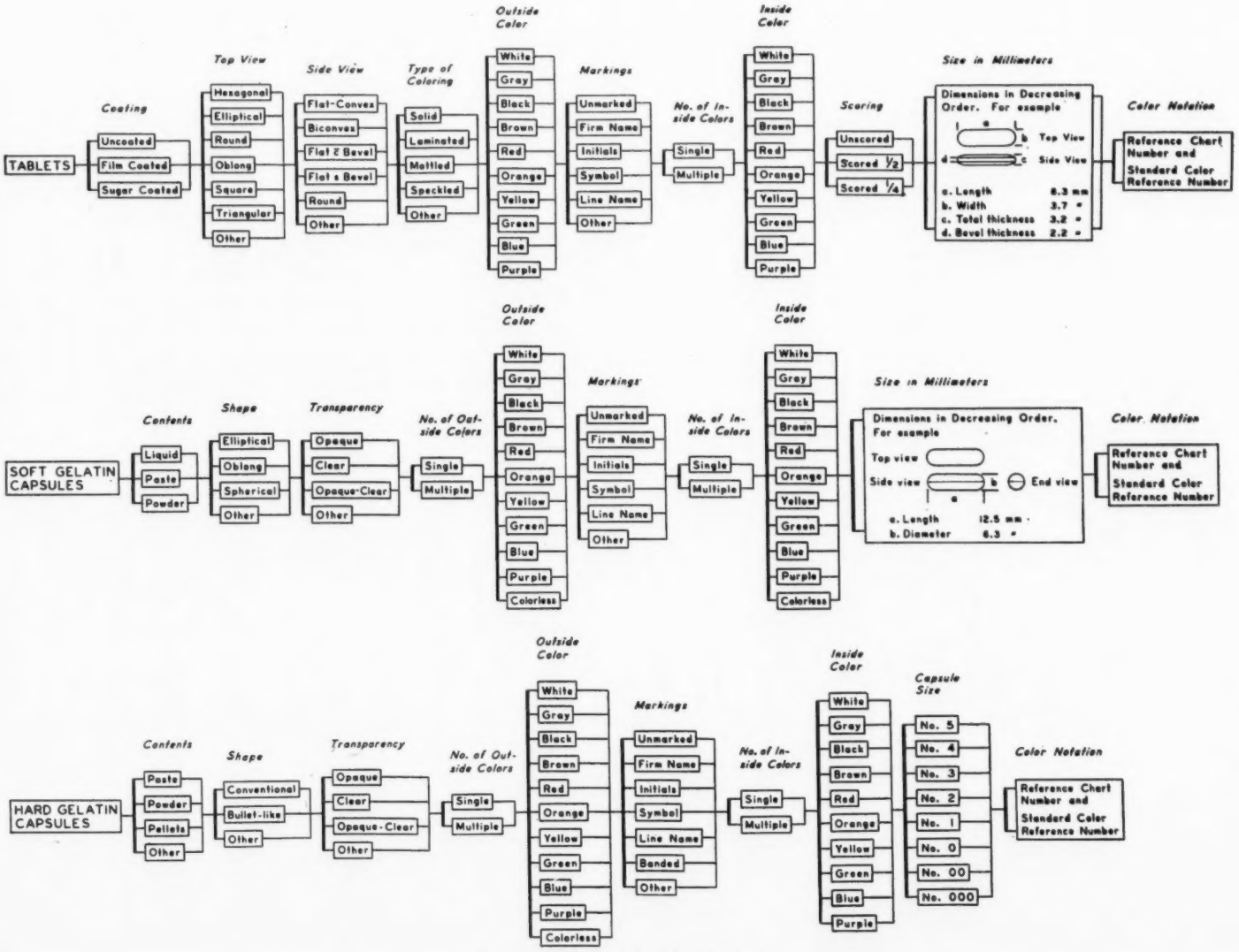


Figure 1 Dosage identification guide

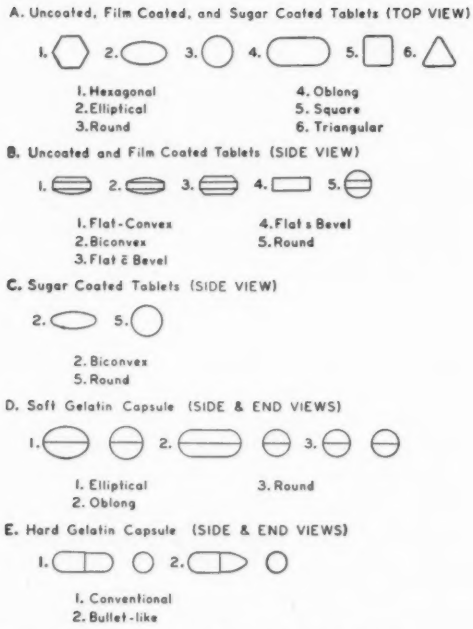


Figure 2 Common tablet and capsule shapes

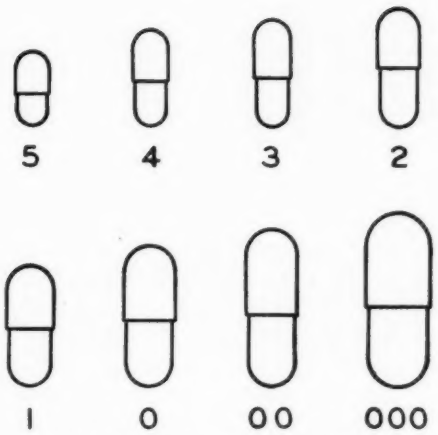


Figure 3 Standard capsule sizes (actual size)

1	2	3	1	2	3
8.0	3.0	1.2	10.5	4.5	2.6
8.0	3.5	2.0	10.5	4.9	2.4
8.0	3.7	2.0	10.6	4.8	2.8
8.0	4.3	2.1	11.1	4.6	2.5
8.8	3.6	1.9	11.1	5.9	3.9
8.8	3.6	2.0	11.2	4.9	3.2
8.8	3.7	2.0	11.2	5.0	3.1
8.9	3.4	1.5	11.2	5.4	3.4
9.6	4.3	2.3	11.2	5.9	4.2
10.4	4.3	2.3	12.8	5.0	3.0
10.4	4.4	2.5	12.8	5.1	3.0
10.4	4.5	2.6	12.8	5.6	2.6
10.5	4.0	2.0	16.0	6.7	4.0
10.5	4.4	2.4	17.7	8.7	3.4

1-Diameter in mm, 2-Thickness in mm, 3-Bevel Thickness in mm

Figure 4 Dimensions of uncoated, round, biconvex, white, unmarked and scored ½ tablets

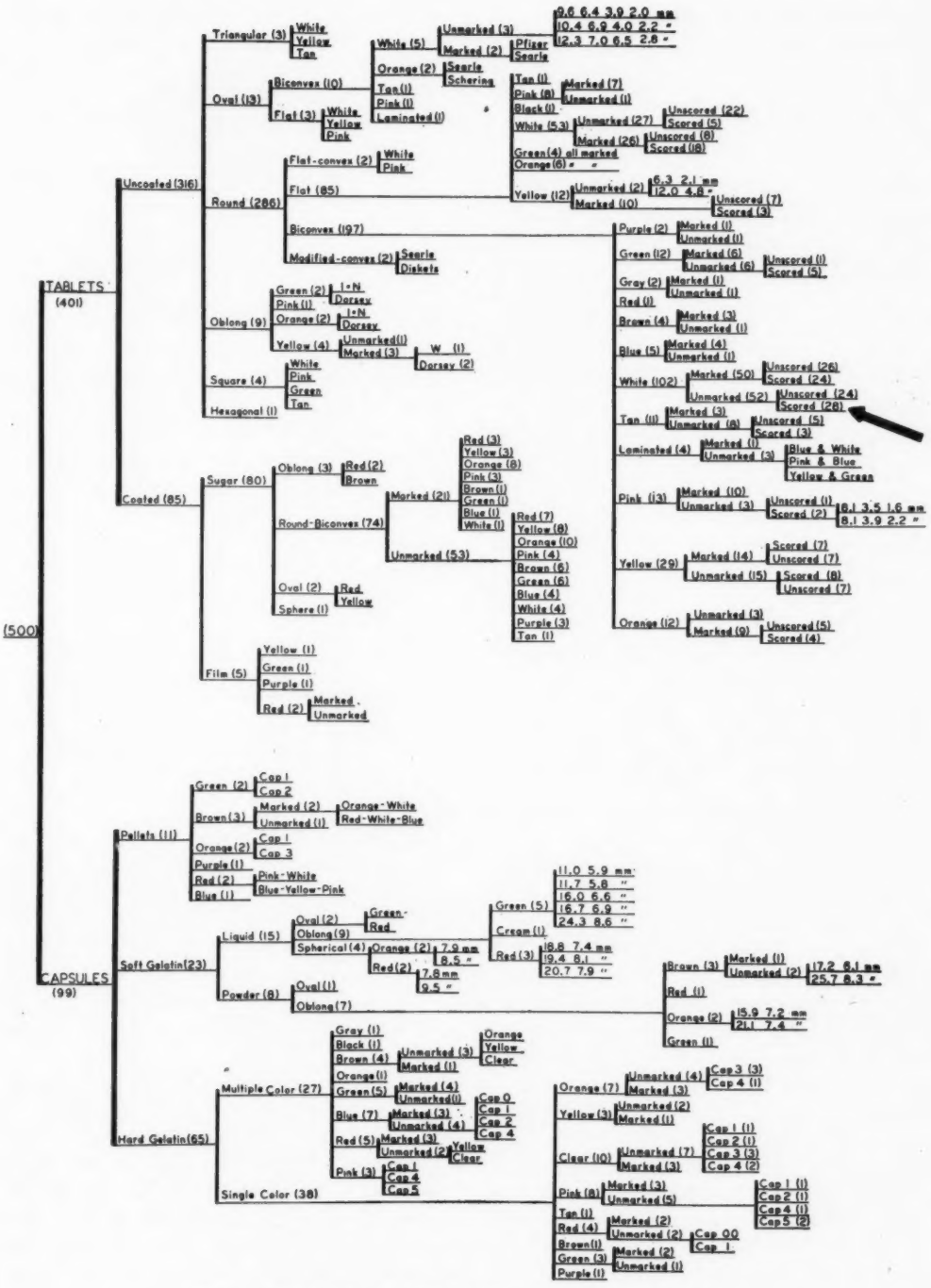


Figure 5 Breakdown of 500 products used in the pilot study

Autovaccination in instances of actinomycosis

O. Lorenz. *Zahnärztl.Welt & Reform* 59:664-665 Nov. 25, 1958

Actinomycosis, a parasitic, infectious and inoculable disease affecting animals and communicated to man, is caused by *Actinomyces israeli*, an anaerobe, and certain species of *Nocardia*, a genus of aerobic fungi of the family *Actinomycetaceae*.

In man, the jaw is commonly involved (cervicofacial type) although other parts of the oral cavity, such as the tongue, and the salivary glands or other organs and systems may be affected (abdominal, thoracic or mediastinal types). The disease is characterized by the formation of slow-growing granulomatous tumors which usually suppurate, discharging through multiple draining sinuses a thick oily pus containing yellowish granules, and by symptoms of sepsis.

In the lesions caused by actinomycosis there is severe bone destruction with little tendency to repair. There is also a gradual resorption of the trabeculae of bone and continued formation of soft tuberculous granulation tissue which is characterized by epithelioid cells with large nuclei. Small lymphocytes surround the lesions. Caseation, as a form of coagulation necrosis, supervenes in the center of the lesions and is caused by bacterial toxins.

The treatment of the general condition is of primary importance, and antituberculous measures should be instituted as soon as possible. These include the administration of streptomycin and para-aminosalicylic acid (PAS). Local treatment consists of greater attention to oral hygiene, removal of loose teeth, incision and drainage combined with sequestrectomy whenever detachment of necrotic bone has occurred.

Recently, many dental schools in Germany have tested an autovaccine prepared from *A. israeli* cultures isolated from the secretions of tissues of patients with actinomycosis. This bacterial vaccine, produced by the Hygiene Institute of the University of Cologne, caused antigenic products to be formed and liberated from the invading microorganisms, thereby bringing about the accumulation of antibodies which react specifically in vivo and in vitro with the homologous antigens.

Dental schools have reported that highly satisfactory results have been obtained as a result of autovaccination, especially in actinomycosis of the jaws.

Hütten Hospital, Luisenstrasse 27, Dortmund, Germany

Treatment of rheumatic facial paralysis

Med.Klin. 46:2008 Nov. 14, 1958

Q.—The patient, a 24 year old woman, has suffered for more than six months from a unilateral (right-side) facial paralysis associated with severe pain attacks below and behind her right ear. Neurological examinations revealed a serious impairment of motor function of the seventh cranial nerve probably caused by rheumatism occurring in childhood. The patient's history showed that she had acute rheumatic fever characterized by chorea, delirium, convulsions and coma when she was six years old.

Electrotherapy obtained slight but temporary improvement in the unilateral facial twitching but no relief of pain. What treatment method is suggested to help the patient who already shows symptoms of an inferiority complex obviously produced by the patient's awareness of her facial distortions?

A.—Because the onset of the facial paralysis occurred more than six months ago, pharmaceutical treatment alone will not be successful. According to the data presented, the diagnosis, rheumatic facial paralysis, cannot be doubted. Daily intravenous injections of 1 mg. histamine diphosphate in 250 ml. of water, administered for at least five consecutive days, can be recommended.

If recovery still is delayed, surgical decompression of the facial nerve by opening the facial canal from the stylomastoid foramen to the lateral canal appears to be indicated. Postoperatively, massage of the facial musculature will prevent muscular atrophy, and prednisone administration (in doses of 15 to 30 mg. daily) may restore the gross movements of the facial musculature but not the more delicate facial expressions.

Langenbeckstrasse 1, Mainz, Germany

Histology

Histological investigation of the organic elements of human enamel

Bertrand Kerebel. *Cah.odontostomat.,Marseille* 8:71-82 Jan.-March 1958

The development of knowledge of the organic elements of human enamel, which is a prerequisite for progress in preventive dentistry, has been delayed by the fact that various authors have questioned the existence of organic elements in the enamel of human permanent teeth.

In a series of histological studies, carried out at the Dental School of the University of Paris, the problems of immobilization and decalcification, which appeared to be the crucial factors in successful isolation of organic constituents of enamel, were solved by comparatively simple technics.

Demineralization was achieved primarily by the use of a low-temperature decalcification with 5 per cent trichloroacetic acid applied to adult human teeth which had been preserved in 10 per cent Formalin for from seven days to three months prior to decalcification. Every specimen was immobilized in an individual celloidin bag.

After the specimens had been exposed to the acid for two hours, the enamel cuticle could be observed as a thin and transparent membrane which was slightly elevated from the enamel surface. After a period of from two days to two weeks, the enamel had been demineralized and looked like a transparent membrane; it could easily be torn to pieces if carelessly handled. Still under low temperature, the specimens were washed free from acid by lifting each celloidin bag from one cold water bath to another.

Under electron microscopes, the internal portion of the organic framework of the enamel of mature human teeth was studied. In contrast to the homogeneous external portion of the enamel, with its wide and straight prism sheaths, the internal organic elements are characterized by densely formed prism sheaths which appear to be arranged in longitudinal segments. When observed in transverse sections, the central part appears to be in the form of tufts, and in longitudinal sections in a corrugated pattern.

The formation of the external dentin surface, which embryologically occurs before the formation of enamel, must have a bearing on the developmental pattern of the organic elements of the internal enamel.

The investigation confirmed that an organic framework exists within the enamel prisms and that the transverse striation of the enamel prisms and the interprismatic substance as well as the thin interprismatic longitudinal striation are constituent parts of the organic enamel elements.

The electron microscopic appearance of the incremental lines of the enamel, previously demonstrated in earlier microscopic studies of ground sections, is obviously caused by the formation of the organic membranes surrounding the enamel prisms. In the decalcified sections of deciduous human teeth the brown lines crossing the enamel prisms (Retzius' parallel striae) and the neonatal lines were found to be composed of various heavy zones in the prism sheaths along regions of simultaneously developed enamel formation.

L'Ecole Odontologique de l'Université de Paris, France

Agranulocytosis

F. Lange. *Deut.med.Wschr.* 83:1791-1792 Oct. 3, 1958

Agranulocytosis is an acute febrile disease which frequently is caused by drugs such as aminopyrines, barbiturates, sulfonamides and, occasionally, penicillin.

It is characterized by a considerable reduction in the number of granular leukocytes in the blood. The total white blood count is low, and the polymorphonuclears may be reduced to 5 per cent or even less. Necrotic and ulcerative lesions of the gingiva, the mucous membranes of the mouth, throat and other regions start in tissues bordering the sulcus. Pathologic microorganisms are able to act quickly in the involved tissues because of the lack of phagocytic granulocytes. The infec-

tion spreads toward the surface of the gingival tissue and into the periodontal membrane and the marrow of the alveolar bone, thereby destroying the supporting tissues of the teeth.

The disease affects women more than men. Its onset is sudden and is accompanied by a raised temperature. The mortality rate is from 50 to 80 per cent; death sometimes occurs within a week after the appearance of the initial symptoms.

The only known effective treatment of agranulocytosis consists of intramuscular injections of pentnucleotide to stimulate the marrow of the affected bones to produce granulocytes. The recommended dose is 0.7 Gm. administered twice daily until the leukocytic count begins to rise. Later only one injection is given daily until the count becomes normal.

Roentgen-ray stimulation of the afflicted regions has proved to be of assistance to pentnucleotide treatment. In most instances, frequent blood transfusions are indicated to help the patient to overcome the initial period.

Obviously, the further administration of the drug or drugs suspected of having caused the disease is contraindicated. Even the smallest dose of such an agent may bring about sudden relapse.

Forstenriederstrasse 211, Munich 55, Germany

Electronmicroscopic studies of the normal and pathologically changed oral mucosa

Herrmann Themann.
Fortschr.Kief.Ges.Chir. 4:390-398 1958

Electronmicroscopic studies to determine the histologic structure of the normal oral mucosa and of carcinoma and leukoplakia (without evidence of malignant degeneration) of the oral cavity were undertaken at the Dental College of the University of Münster, Germany.

Specimens for electronmicroscopy were prepared by standard procedures.

The following observations were made:

1. In the normal oral mucosa a double layer of mucous membrane divides the epithelial from the connective tissue.

2. The germinativum epidermis (stratum spinosum) is characterized by a specific intercellular system intersected by various protoplasmic structures which unite adjacent cell elements. These structures interlock like dovetails and link together the individual cells.

3. Small granules of rod-shaped structures (mitochondria) are regularly present in the basal cells of the epithelium but are absent in the superficial layers.

4. The cells of squamous cell carcinoma are characterized by a considerable increase of mitochondria. The size and shape of these cytoplasmic organelles, however, vary considerably.

The electronmicrogram of leukoplakia of the oral cavity resembles that of squamous cell carcinoma.

Hüfferstrasse 68, Münster, Germany

Accumulation of strontium-90 in dental tissues

W. Holgate, R. H. Mole and Janet Vaughan.
Nature 182:1294-1295 Nov. 8, 1958

Weanling rabbits given single injections of 500 to 1,000 microcuries of strontium ^{90} per kilogram of body weight showed a high frequency of tumors of the jaw. Preliminary histological studies suggest that the tumors arose in close relation to the teeth.

The amount of strontium ^{90} in the teeth increases for at least 30 days after injection and then falls abruptly. The initial increase with time after injection in the amount of strontium ^{90} in the teeth contrasts noticeably with the steadily decreasing amount of strontium ^{90} in the femur of the rabbit. The intensity with which the jaw is irradiated by a local radioactive deposit in the teeth may well be unrelated to general levels of deposition in bone. This may be specially important in species like man, where the teeth do not wear away to the same extent as in rodents, and where strontium ^{90} incorporated into calcifying teeth will be much more permanently fixed than in rodents.

Royal Naval Medical School, Alverstoke, Hampshire, England

Education

Teaching prosthodontics by television

Heinz O. Beck. *J.D.Educ.* 22:306-311 Nov. 1958

Since September 1955 closed circuit television has been used as a teaching aid at the Dental Branch of the University of Texas. The Dental Branch building was designed for television use. The freshman and sophomore classes are stationed on separate floors and each floor has 25 four-man unit laboratories; each unit laboratory has a remote 17-inch monitor and a microphone for two-way voice communication between the students and the teacher who is giving a television demonstration. Television demonstrations have been used to varying degrees in such courses as gross anatomy, physiology, microbiology, dental materials, dental anatomy, endodontics, preventive dental medicine and partial dentures. The sophomore course in complete dentures has been presented entirely by televised demonstrations.

In teaching of the complete denture course by television, patient demonstrations are presented to correlate laboratory technics with clinical practice. Several auxiliary aids include a manual of laboratory exercises, an illustrated text on complete dentures, and a display case and materials which illustrate the individual steps of procedure.

The following observations have been made on the use of television in teaching dental subjects:

1. The student must be taught how to use the medium of television early in his career.

2. The course material must be modified to fit the medium of television. Auxiliary aids are not as necessary as "live" models.

3. The teacher must know the material which he intends to present and must present it in a logical sequence without referring to lecture notes.

4. Televised programs should be not longer than 30 minutes.

5. A "live" audience of four students in the studio will tend to overcome an unexplainable psychological barrier which otherwise often exists between teacher and students.

6. A team approach which permits varying the voice tones in the audio portion of the program helps hold the interest of the student.

7. Student interest can be maintained by making use of practical demonstrations on patients.

8. Television demonstrations reduce the number of individual group demonstrations by teachers in the laboratories, since each student has a front row seat and view.

9. Since television demonstrations to the entire class replace lectures and individual group demonstrations, the student's productive time is increased.

Testing procedures should be devised to evaluate the student's progress in the televised course.

From observations to date, it can be assumed that television is as good as or slightly better than other teaching methods for the good and average student in regard to the absorption and retention of the course material. For the below average student, absorption and retention of material taught by television are about the same as when the subject is taught by the customary lecture.

University of Texas Dental Branch, Houston, Texas

History of prosthetic dentistry: I

Gernot Rath. *Ciba Symp.* 6:9-18 June 1958

Prosthetic dentistry has a long history; so long that Hedvig Lidforss Strömgren, the Danish dental historian, considers that the practice of replacing lost teeth dates even further back than the earliest treatment of tooth diseases.

From the replacing of a lost tooth—which in primitive times was accomplished by forcing the tooth back into its alveolus rather than by fastening it to the healthy neighboring teeth—to replacing it with an artificial tooth seems to be only a small step. This step, however, had been taken by various peoples and races during different periods of civilization since time immemorial.

The earliest mention of prosthetic dentistry dates from the fifth century B.C. It appears in the *Twelve Tables*, an accumulation of civil laws, which was one of the first legal works of the Romans. The *Tenth Table* contains a law designed to control the lavish expenditures of a Roman funeral. It forbade the offering of burial gifts made of gold but specifically excluded from this prohibition were "gold wires and gold bridges used for binding the teeth together." These, it was stated, might be left in the mouths of the deceased. Since these laws were codifications of previously existing customary secular laws, the reference to gold for fastening teeth suggests that the art of prosthetic dentistry was well-known and that the prosthetic technics were no longer considered as anything new to the Roman lawmakers.

Ancient Rome, however, was by no means the cradle of prosthetic dentistry. The excavation of a Phoenician tomb in Sidon (now Saida, Lebanon), revealed a jaw in which two artificial incisors were skilfully attached with gold wire to the remaining incisors and cuspids. The jaw, which today is exhibited at the Louvre in Paris, was named after its discoverer Gaillardot, and probably dates from the fourth century B.C. As a point of interest, the artificial teeth are not—as it was initially assumed—lower incisors but upper incisors. Other items found in the Phoenician tomb were small statues of Egyptian gods, a fact which suggests that the technics of Phoenician prosthetic dentistry derived from early Egyptian methods.

Although Karl Sudhoff stated that "of all the thousands of teeth found in Egyptian tombs and in mummies not a single one shows any trace of dental technics," two molars, encircled with gold wire, were discovered in the cemetery of El Gizeh, near the Great Pyramids and the Sphinx. These two molars constitute the oldest example of prosthetic dentistry as yet discovered, dating from about 2500 B.C.

Another object—a bridge made of gold wire—was unearthed near the necropolis of Sidon in 1901. In Attica, the heart of early Greek civilization, another gold bridge was found in which the artificial teeth were held together by gold bands instead of wires. This bridge, believed to date from the third century B.C., shows the characteristics of the dental technics used later by Etruscan craftsmen.

Between the eighth and the fourth centuries B.C., the art of ancient prosthetic dentistry reached its zenith in Etruria (now Tuscany and parts of Umbria in Italy), the country of the Etruscans. The various examples of prosthetic and conservative dentistry, excavated in the necropolis of Tarquinia, reveal a technical skill which merits admiration by the modern observer. The few remaining examples of Etruscan dentistry probably represent only traces of the accomplishments of the Etruscan dentists. Most gold prostheses went into the melting pots of the conquerors.

Obviously, the Etruscans had progressed beyond the primitive forms of prosthetic dentistry such as the fastening of loose or artificial teeth to the adjacent teeth with gold wires; there were many broad and solid gold bands and skilfully modeled gold bridges. The outer rings of the bridges were fixed on the retained teeth and the spaces were filled with pieces of ivory or animal bone, accurately cut and carefully fitted into the

Figure 1 Artificial teeth, fastened by gold wire, found in a tomb near Sidon (Phoenicia)

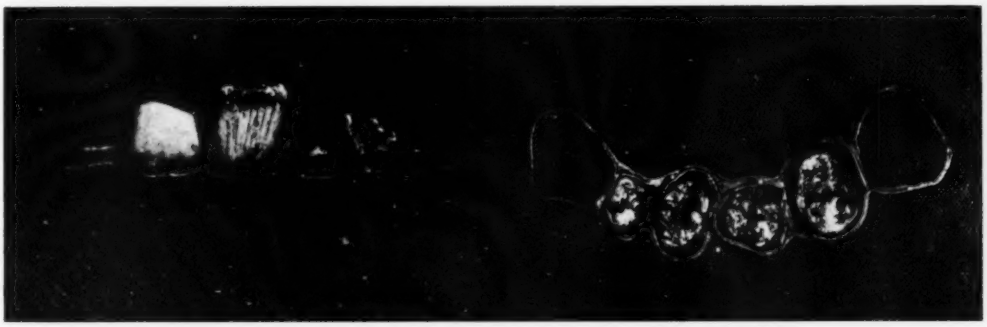


Figure 2 Etruscan gold bridge. Left: Anterior view. Right: Occlusal view

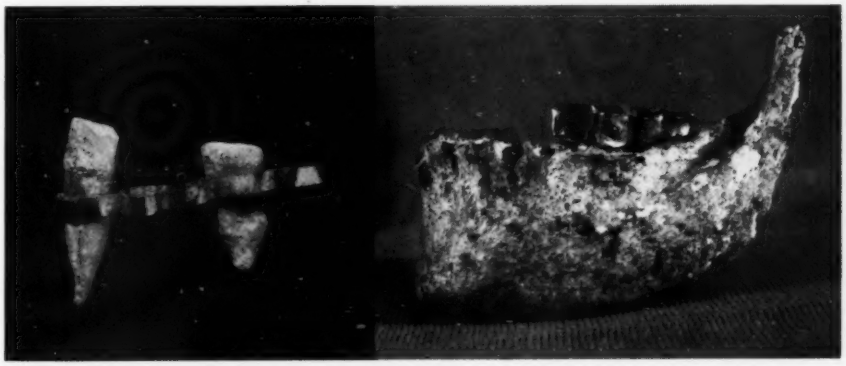


Figure 3 Etruscan gold bridges. Left: Found in Tarquinia, Italy. Right: Found in Civitacastellana, Italy

Figure 4 Upper and lower dentures, carved from the femur of an ox. A spring of tin and wires connect the dentures. Excavated from a tomb in Switzerland (approximately 1500 A.D.)

clasping rings. Calves' or human teeth were used as tooth replacements. The prosthetic technics of the Etruscans were taken over by Roman craftsmen. Examples of their work were discovered in Roman graves—the earliest found in the necropolis of Teano dates from the third century B.C. The high technical mastery of the Etruscans and Romans was achieved nowhere else in the world before the eighteenth century.

It must be remembered, however, that only in the rarest of instances was it possible to bite or chew with the artificial teeth—prosthodontics in ancient times served almost exclusively esthetic purposes. This explains the absence of references to prosthetic dentistry in the medical literature recorded in Egypt, Phoenicia, Greece and Rome of that time.

In the first century A.D., Aulus Cornelius Celsus, the Roman medical writer, advocated the fastening of loose teeth with gold wires, but neither he nor Galen (200 A.D.) had anything to report on replacement of lost teeth. These writers would not have ignored such features of technical skill if the prostheses had served any useful purposes such as mastication. Apart from a possible improvement in enunciation as a result of filling the gaps in the dental arch with artificial teeth, neither the Etruscan nor the Roman prostheses had any practical value.

In contrast to the silence of the ancient medical writers in regard to dental subjects, in poetry, essays and dramas of these periods ample evidence can be found that artificial teeth were widely used. The Roman poets, Ovid, Horace, Juvenal and many others have left no doubt that prosthetic dentistry was practiced in Rome and in other cities at that time. Fine white teeth set between a pair of well-shaped lips, especially in women, were highly regarded by the ancient Romans. Discoloration of the teeth was considered a grave misfortune, and tooth loss a catastrophy. Martial asked in one of his amusing couplets: "How did it come about that Thais had black teeth and Laecania pearly-white ones?" And he gave the answer: "Thais has retained her own teeth."

Institute of Medical History, University of Bonn, Germany

William Thomas Green Morton

Orlan K. Bullard and Albert M. Betcher. *Anesthesiology* 19:292-293 March-April 1958

In this exchange of letters, Orland K. Bullard, a dentist, observes that William Thomas Green Morton was a dentist, whereas an editorial by Albert M. Betcher had quoted from a news story in the *New York Tribune,* July 17, 1868, which called Morton a Doctor of Medicine.

States Betcher in part:

"It is true that at the time of his demonstration at the Massachusetts General Hospital, October 16, 1846, he was referred to in the *Boston Daily Journal* of the next day as, Dr. Morton, Dentist. Also, in Jacob Bigelow's letter to Francis Boott of London of November 28, 1846, he stated: 'The inventor is Dr. Morton, a dentist of this city. . . .' In this same year, Morton issued a circular to 'Surgeons and Physicians' announcing his competency in administering 'his compound to patients who are to have surgical operations performed,' and signed it W. T. G. Morton, Dentist.

"However . . . by 1850 he had published two papers with a different signature: 'Comparative Value of Sulphuric Ether and Chloroform,' by W. T. G. Morton, M.D., Boston, *Boston Med. Surg. J.* 43:109-119, Sept. 11, 1850, and 'On the Physiological Effects of Sulphuric Ether and its Superiority to Chloroform,' by William T. G. Morton, M.D., Boston, printed by David Clapp, Medical and Surgical Journal Office, 184 Washington St., 1850.

"Something must have happened between 1846 and 1850 to permit him to place an 'M.D.' after his name. . . . The answer can be found in the following quotation from H. R. Raper: 'Irate dentists have on occasion hotly accused the medical profession of kidnapping Morton because of his anesthesia fame, but this seems rather foolish. What happened was a natural development. . . . The Washington University undoubtedly conferred the M.D. degree on Morton in 1849 because they thought he deserved the honor; and once he received it he became identified with Medicine.'"

3 Penn Center Plaza, Philadelphia 2, Pa.

Dentistry around the world

A visit to Polyclinic no. 3, Moscow, Russia

Milo Danzeisen. *J.Michigan D.A.* 40:270-271 Nov. 1958

During his tour of duty in the U. S. Army Dental Corps, the author on June 21, 1958, visited the Third Polyclinic in Moscow. He was received officially by the head physician, the head dentist (Dr. Asner) and a nurse, all of whom were cordial.

The clinic corresponds to a public health dispensary. It has divisions of internal medicine, neurology, otolaryngology, dermatology, roentgenology, physiotherapy, gynecology and stomatology. The clinic was opened in 1955, and probably is one of the largest in the city. It cares for 1,500 to 2,000 patients daily. The staff includes 160 physicians (only 10 men) and 26 dentists (only 3 men). Moscow has more than a hundred similar clinics throughout the city.

Although the guide reported that "everything is free at the clinic," the patient must pay for medicine and drugs.

In the U.S.S.R., dentistry is a specialty of medicine. Dr. Asner had received 10 years of primary schooling (equivalent to our 12 years); five years in college, graduating as a general practitioner of medicine, and two years of specialized study in stomatology. At the clinic Dr. Asner works six days a week, five and a half hours a day. Occasionally, he must work overtime and for this receives extra pay. His normal salary is 1,600 rubles a month.

The dental division of the clinic has separate rooms for roentgenology, diagnosis, surgery, operative dentistry, prosthetics and laboratory work. The roentgenology room was shielded with lead and appeared adequate. The diagnosis room had three chairs but only a few instruments—by American standards, it had only the bare necessities. The surgery room also had limited equipment but was immaculate.

The room for operative dentistry was functional but with limited facilities. Each dentist had only a few instruments and medicaments in the cabinet. Dr. Asner said that drilling was accomplished with instruments operating at 3,000 to 5,000 rpm. The Russians had some drills which operated at speeds over 50,000 rpm, but none of the faster drills was available at this clinic. Silicate and other cements and amalgam were the only materials used for restorations. On request, a dentist prepared a mix of amalgam. The preparation was unusual in that it was washed with ammonia. The mixing was done with mortar and pestle.

In the prosthetic department, one dentist was preparing a maxillary arch for a partial denture by seating several steel crowns on the abutment teeth. Another dentist was inserting a partial denture constructed of acrylic resin with metal clasps as direct retainers. A third dentist in this department was taking denture impressions with plaster.

About 15 people worked in the two-room dental laboratory. The first room was used for curing acrylic dentures, and the second room for articulation, setting of teeth and waxing of dentures.

The clinic was impressive for its cleanliness and the friendliness of the staff. Its work and facilities are somewhat below the standards prevailing in the military services or in dental clinics in the United States.

Temperance, Mich.

Notes on dentistry in Sweden

Governors Letter, Canad.D.A. 8:1-3 Jan. 31, 1958

School dental services in Sweden were started in 1905, supported by individuals and the Swedish Red Cross. A public dental service law came into force January 1, 1939. To receive government subsidies, the 25 counties and six larger municipalities must provide dental clinics where children and adults are treated. The public dental service is administered by the county council. Each district has a dental officer engaged by the local authorities and reporting to the Royal Medical Board from which he takes his instructions. Complete dental service is rendered except for orthodontic service.

Children from 3 to 15 years old are entitled to free service. Those 7 to 15 years old receive priority; children three to six years old are treated if time is available. Special dental service is available to expectant mothers. Patients 16 to 19 years old receive a reduction of 25 per cent in the scheduled dental fees. Actually, only children in the age group from 9 to 12 years receive complete dental care.

Most of the nation's 4,500 dentists serve in the Public Dental Service. They are obligated to give 55 per cent of their time to patients in the group from 7 to 15 years old. Dentists in the service are required to work 42 hours a week, 47 weeks a year. After the dentist has given 55 per cent of his time to children, he may serve adults, who pay in accordance with a low fee schedule. The dentist may receive special pay for giving more than 55 per cent of his time to children. Also, he receives 25 per cent of the fees paid by adults. One fourth of the dentists in Sweden are women.

Salaries for dentists in the Public Dental Service range from 25,000 to 35,000 kroner ($5,000 to $7,000). This rate is on the same level as salaries received by university professors.

Dental schools are maintained at Stockholm, Malmö and Umea; a fourth school is to be built at Gothenburg. The five-year dental course is financed entirely by the state. Instruments are owned by the state and loaned to students. Students are required to buy only a few small items such as burs. The accommodation per class is as follows: Stockholm, 50; Malmö, 50, and Umea, 20. Two classes are admitted each year, so that ten classes are attending each school at all times. A maximum of 240 dentists graduate each year; the proposed school at Gothenburg will, when built, raise this total to about 350.

Medical and dental schools in Sweden accept only those applicants with the highest academic standing. There are four applicants for each available place. The health professions are the first choice of most Swedish youth.

The standard of dentistry practiced in Sweden appears high. The ratio of dentist to population is 1:1,650.

234 St. George Street, Toronto 5, Ontario, Canada

Notes on dentistry in Finland

Don W. Gullett. *J.Canad.D.A.* 24:591-592 Oct. 1958

Of the 1,500 dentists in Finland serving a population of 4,200,000 about 1,200 (80 per cent) are women, most of whom are married. Finland has one dental school, the Institute of Dentistry in Helsinki, which forms part of the Faculty of Medicine of the University of Helsinki. University education is free. Students pay a small fee for incidentals and buy some small instruments. The average dental student spends 5½ years in preparation for graduation. On successful completion of the first two years, the student is awarded the title Candidate of Odontology (Cand.Odont.). After successfully completing the final examinations, the student receives the degree Licentiate of Odontology (Lic.Odont.). Through postgraduate studies the degree of Doctor of Odontology (Dr. Odont.) may be obtained; this doctoral degree is compulsory for all senior teaching positions.

Finland has no public health dental service corresponding to that in Norway or Sweden. Dental services for all school children are free. About 20 per cent of such services are rendered in public clinics and 80 per cent in private offices. In the entire country, not more than 50 dentists are employed on a full-time salary basis. Dentists in Finland favor private practice and mean to retain their independence; as a rule, they do not accept employment in any public health program for more than half-time (three hours a day).

The school clinic consists of a central clinic with administrative offices, special orthodontic and oral surgery services, and of branch clinics for operative service. For services rendered children in private practice, the dentist is paid on the basis of a fee schedule.

The services in clinics are rendered for children aged 7 to 14 or 16 years. Deciduous teeth are not treated except for relief of pain.

No courses of training for auxiliary personnel exist in Finland. Technicians are employed mainly by the dental laboratories.

234 St. George Street, Toronto, Ontario, Canada

General

Leonardo da Vinci and his drawings of deformities of the face

G. Panconcelli-Calzia. *München.med.Wschr.* 99:1960-1962 Dec. 20, 1957

Leonardo da Vinci (1452-1519), the great Italian painter, sculptor, architect, musician, technician, engineer, philosopher and anatomist, was one of the first to describe various types of facial deformities and to picture them in his drawings.

He possessed a knowledge of the normal and abnormal function of the organs in the maxillofacial region—unusual at that time—which he obtained by dissection of human corpses.

Leonardo was not one of the artists of the Renaissance who sought only to revive the ancient glories of art by imitation of cultural works of the Greeks and Romans. He was an ardent student of nature. He discovered or rediscovered the laws of light and shade, of perspective, including optics, of physiology (especially eyes and teeth), and of human and animal anatomy and muscular movement. His insatiable spirit of inquiry led him to picture abnormalities, especially of the human face, in paintings, drawings and sculptures.

The period from 1480 to 1500, after his preparatory studies on human anatomy, produced drawings which today are still admired for their accuracy. Anatomicopathologically, Leonardo's drawings cannot be regarded as mere caricatures even if the artist, to emphasize an observed abnormality, was tempted to exaggerate.

Surgical repair of cleft lip obviously was known and performed during Leonardo's time. He drew not only a person before such an operation was performed but also persons after an unsuccessful surgical correction. He depicted prognathism, and was the first to detect the maxillary sinus which, therefore, should have been named "antrum of Leonardo da Vinci," and not "antrum of Highmore." Nathaniel Highmore, an English surgeon, described the maxillary sinus in 1668, that is, more than 200 years after Leonardo's report.

Deformations of the human face, however, played an important role in the art of ancient people, centuries before Leonardo da Vinci. Ceramics, ritual masks, drawings and sculptures made by the ancient Aztecs and Incas, and found in the ruins of Tiahuanaco, Peru, show the high standards of Indian art before the thirteenth century and the high degree of anatomical knowledge possessed by these Aztec and Inca artists. Indigenous motifs appeared in the Peruvian (pre-Columbian) paintings and sculptures dealing

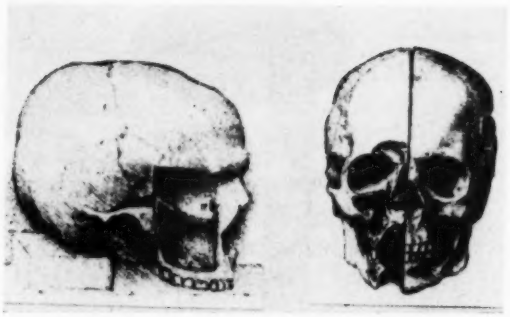
Cleft lip

Center: Drawing by Leonardo da Vinci (1480)

Left: Patient before surgical repair

Right: Patient after surgery

Prognathism. Left: Mandibular projection. Right: Maxillary projection



Maxillary sinus. Left: Lateral view. Right: Anterior view

Cleft lip. Inca ceramic

Malformation of the lower jaw. Left: Simple unilateral swellings. Right: Combined with cleft lip (probably after an unsuccessful surgical repair). Aztec ceramics

Inca mask "Devil of Toothache" or "Devil of Deafness"

realistically and sometimes even surrealistically with the life of the people.

Distinctive regional cultures flourished in almost every part of the central Andes from approximately 400 to 1000 A.D. Archaeologists call this the classic period of pre-Columbian South America because of the high artistic and technical achievements in ceramics, metallurgy, weaving, architecture and natural sciences.

Some of the outstanding local cultures are: (1) the Mochica (early Chimu) of the north coast of Peru, noted for the faithfully modeled and realistically painted ceramics; (2) the Nazca of the south coast, famed for polychromic embroideries and multicolored clay vessels; (3) the Recuay of the northern highlands, important for the incised figurines on ceramic vessels, and (4) the Tiahuanaco of the Bolivian highlands, noted for the polished and fitted stone masonry and the low relief carvings.

With the Spanish invasion led by Pizarro, the early South American culture came to a sudden end.

Lottbektal 17/19, Hamburg-Bergstedt, Germany

The expansion of fringe benefits and industrial dentistry

Leonard S. Morvay. *Indust.Med.& Surg.* 27:402-403 Aug. 1958

The trend in fringe benefits soon may be reflected in expanding requirements for dental services. Clauses providing for dental treatment are being included in union contracts, workmen's compensation legislation and industrial insurance policies. Medical and dental clinics under union supervision are now accepted establishments under the fringe benefit provisions covering welfare funds.

Management should take the position that, since it is required to pay for medical and dental services, it has the right to provide for them directly. These services should be offered within the plant area, if possible, or close by. A dentist who is familiar with the requirements of industrial dentistry should be retained.

Under labor compensation laws of many states the employer is responsible for the repair or replacement of dentures which are broken accidentally during working hours. The plant dentist often can reduce the loss in productive man-hours and the cost of the treatment by immediate repair of the broken denture.

Plant dental programs also benefit the employee. He is not obliged to go without his dental appliance during the longer period needed for repair by an outside dentist.

Insurance companies soon may include liberal dental services in the provisions of their health and accident policies. In such policies the plant dentist should be designated as the person to render all emergency dental services arising from employee claims. In special instances the services of outside specialists or of the employee's private practitioner may be warranted, and management should cooperate. But when an outside dentist is given permission to institute treatment, he should be informed that only such treatment and fees as have been authorized by the plant dentist will be allowed.

Immediately after an accident involving the jaws, teeth or dental appliances, the plant dentist should determine the extent of injury and evaluate the amount of damage to artificial appliances. If the injured employee were allowed to see his own dentist before the plant dentist made his examination, the evidence might be effaced.

Failure of industry to embrace industrial dentistry may so increase the costs of lost production man-hours and insurance premium rates that these costs will be reflected in annual financial reports.

30 Central Avenue, Newark, N.J.

Modern organization of dental services in the armed forces of various nations

D. J. A. van der Woerd. *Internat.D.J.* 8:465-466 June 1958

Seventeen nations have filled out and returned the questionnaire sent by the Armed Forces Commission of the Fédération Dentaire Internationale. They are: United States, United Kingdom, France, Canada, Australia, Belgium, The Netherlands, Denmark, Luxembourg, Ireland, Switzerland, Peru, Chile, The Philippines, Spain, Vietnam and Greece. In each of these countries, a

dental corps, led by a dental surgeon, is part of the army, navy or air force.

In the U.S. Army at the beginning of this century, some time ahead of other countries, a Dental Corps was established. The head of the Dental Corps is responsible to the Chief Medical Officer. A separate Dental Corps for the U.S. Navy was formed in 1912, and the U.S.A.F. Dental Corps was created in 1949. Although the three Dental Corps in the United States are independent, they are under the Chief Medical Officer.

The same pattern is found for the armed forces in the United Kingdom. In Canada the Dental Corps is no longer a branch of the Canadian Army but is independent under the administration of a Director of Dental Services, who directs the dentists in all three branches of the service. This type of organization recently was adopted by The Philippines.

In the armed forces of Peru there is a health service, with deputies for the Medical and Dental Services.

Commander, Dental Corps, Amsterdam, The Netherlands

Block that injury

Jack F. Cathcart.
J.Health,Phys.Educ.& Recreat. 29:37-38
Oct. 1958

Many of the injuries which occur during high school football games can be eliminated by adequate protective equipment, sound training regulations and adherence to recommended rules for safe, healthful playing. In addition to physical examinations, good nutrition and preseasonal conditioning through calisthenics, proper protective equipment is essential.

A successful program of injury prevention has been observed for the past 15 years at Berkeley High School, Berkeley, Calif. No boy is allowed to play football unless he is fully dressed in a complete regulation football outfit. Face mask or bar arrangement for the helmet and mouth protector, are standard, mandatory equipment. As early as 1949 the entire Berkeley team was fitted with custom-made mouth protectors, which reduced the former high rate of dental injuries to zero. The use of a mouth protector has proved so successful in the prevention of dental injuries at Berkeley High School that it has been adopted for use at other high schools, with the same gratifying result.

The National Federation of State High Schools has recommended in its rule book (1953) that a flexible mouth and teeth protector be worn.

The increased use of mouth protectors has been made possible by the fact that improved mouth protectors now are being manufactured commercially, at a cost which makes it feasible for the school to provide them for all players.

The use of a face mask or bar arrangement attached to the helmet began about 1954. Formerly, a mask or bar had been worn only by players wearing glasses; now they are used by all boys to protect the face from injury and to prevent damage to the nose and mouth. The Wisconsin Interscholastic Athletic Association completed a survey in 1957 which showed that of 15,714 high school boys participating in football, 8,993 (57 per cent) wore masks of five different types. Of these 8,993 boys, only 183 (less than 2 per cent) were injured in the face or mouth. The Wisconsin study, however, showed that masks proved least effective in preventing chipped or broken teeth. There were 121 tooth injuries to boys wearing masks as against 167 dental injuries to boys without this protection.

To provide maximum protection to the teeth and to prevent concussions, it is necessary for a player to wear a mouth protector in addition to the mask. Studies of the manner in which tooth and oral injuries or concussions occur indicate that most result from a blow under the chin, and that region is not adequately protected by a mask.

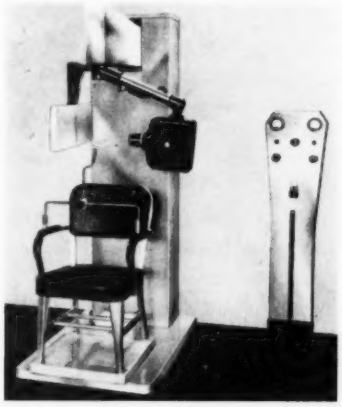
In a 1957 report to California high schools, Willard B. Knowles, California representative on the National Federation of State High Schools' football rules committee, said: "Another item of great importance that needs action on the lower level is the use of the mouthpiece by all players. Face protectors are good but studies have proven that the mouthpiece almost completely eliminates injury to teeth and cuts down very much the injuries to the soft tissue of the head. No boy should play football without using a mouthpiece."

American Trust Building, Berkeley, Calif.

New equipment

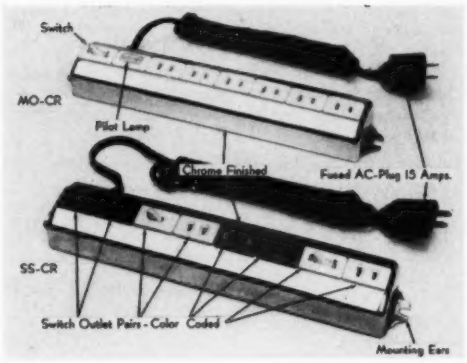
The information reported here is obtained from manufacturers. Dental Abstracts *does not assume responsibility for the accuracy of the information. The interested reader may direct his inquiry to the manufacturer.*

The "Panorex" dental x-ray machine is a self-contained, panoramic, survey type of machine for the busy dental office, clinic or hospital. Use of the Panorex machine results in a vast reduction of radiation to the patient and the operator, because of the small area covered by the narrow beam and because no overlapping occurs. The entire procedure can be completed in 32 seconds. The film size is 5 by 12 inches, and only one film per patient is required. The machine is not expected to replace conventional dental roentgenographic equipment. The prototype of this panoramic machine was developed by the Bureau of Standards at the request of the armed services. *X-Ray Mfg. Corp. of America, 1759 Plaza Ave., New Hyde Park, N. Y.*

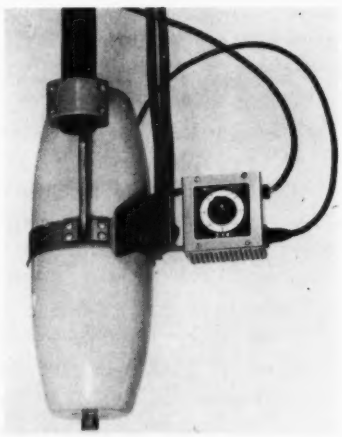


The "Enodonc" gauge eliminates errors of measurement and calculation in root canal work. Successive files and reamers may be set from the same gauge setting. With use of the gauge, three root canals can be treated simultaneously, with a reduction in work time. *Young Dental Mfg. Co., St. Louis 8, Mo.*

The Model MO-CR outlet box is constructed for use in hospitals, offices of physicians and dentists, and laboratories. A flick of the switch provides six outlets. Features include a chrome-plated case with white outlets, pilot light and switch, ten feet of heavy neoprene cord, and two 15 ampere fuses. *C.B.C. Electronics Co., Inc., 2601 North Howard Street, Philadelphia 33, Pa.*



Recent surveys indicate that 90 per cent of all dental operations require less suction than the maximum afforded by the "Pel-Vac Super Evacuator." For this reason, a rheostat now is available with this unit, which will reduce both motor speed and suction, to give maximum quietness. *The Pelton & Crane Co., Charlotte 3, N. C.*



Doctoral and Masters' dissertations

In this column each month are listed recent Doctoral and Masters' dissertations of dental interest, accepted by the dental schools or graduate schools in partial fulfillment for advanced degrees. Copies of many of these theses are available from the schools through interlibrary loan.

Radiation damage in dentists: an occupational hazard (Strahlenbeschädigung in Zahnärzten: Eine Berufsfolge) *Hans Henning von Albert. 1957.* DR.MED.DENT. *Free University of Berlin, Germany.*

The relationship between the major salivary glands and various endocrine organs. *David Bixler. 1956.* PH.D. *Indiana University.*

Factors influencing fluoride metabolism in the rat. *Martin J. Wagner. 1958.* PH.D. *Indiana University.*

The anatomy of the temporomandibular joint in humans. *Nicholas C. Choukas. 1958.* M.S. *Loyola University (Chicago).*

Effects of tooth extraction and apicoectomy on the blood count (Auswirkungen der Zahnextraktion und Wurzelspitzen-Resektion auf den Blutstatus). *Ernst Lautenbach. 1957.* DR.MED.DENT. *University of Bonn, Germany.*

Periodontal disease in miners and their relatives residing in Saarland: therapeutic influence through the use of "Paradentax" and "Blend-a-med" (Über Paradentalerkrankungen bei saarländischen Bergleuten und deren Angehörigen und ihre medikamentöse Beeinflussung durch "Paradentax" und "Blend-a-med"). *Margaretha Paul. 1957.* DR.MED.DENT. *University of Bonn, Germany.*

Application and effect of chlorophyll preparations in the treatment of intraoral wounds (Über die Anwendung und Wirkung von Chlorophyll-Präparaten in der Behandlung von intraoralen Wunden). *Karl Heinz Langeloh. 1957.* DR.MED.DENT. *University of Bonn, Germany.*

Which new theories of caries etiology and prevention were developed by dental research in foreign countries? (Welche neuen Lehren für die Kariesursache und ihre Verhütung ergeben sich aus Auslandsforschungen?) *Alfred Kunkel. 1958.* DR.MED.DENT. *University of Bonn, Germany.*

Treatment of inflammatory periodontal disease by using "Para-Muc" and "Ad-Muc" (Die Behandlung entzündlicher Paradentopathien mit "Para-Muc" und "Ad-Muc"). *Kurt Kesseler. 1958.* DR.MED.DENT. *University of Bonn, Germany.*

Changes in the blood count after tooth extractions and major oral surgical interventions (Blutbildveränderungen nach Zahnextraktionen und grösseren zahnärztlichen Eingriffen). *Roland Arnold. 1957.* DR.MED.DENT. *University of Leipzig, Germany.*

Comparative investigations to determine the resistance to penicillin and streptomycin of staphylococci and streptococci in patients with dental caries and inflammatory changes in the oral cavity: the spectrum cylinder test and the tube substance test (Vergleichende Untersuchungen zur Frage der Penicillin- und Streptomycin-Resistenzbestimmung bei Staphylokokken und Streptokokken Karieserkrankter und Kranken mit entzündlichen Veränderungen in der Mundhöhle: Der Streifen-Zylinder und der Röhrentest). *Horst Lüdecke. 1957.* DR.MED.DENT. *University of Leipzig, Germany.*

Topical application of a paste containing chlortetracycline hydrochloride in infectious processes of the oral cavity (Die lokale Anwendung der Aureomycin Hydrochlorid Paste bei infektiösen Prozessen der Mundhöhle). *Ingrid Keskül. 1957.* DR.MED.DENT. *University of Münster, Germany.*

Proteins in the human saliva excreted by the parotid gland (Die Proteine des menschlichen Parotisspeichels). *Raimund Harndt. 1957.* DR.MED. DENT. *University of Münster, Germany.*

Compatibility of 4 per cent anesthetic solutions of "Oxyprocaine forte" (Die Verträglichkeit der vier-prozentigen Anästhesielösungen mit besonderer Berücksichtigung von "Oxyprocain forte"). *Georg Krüssmann. 1957.* DR.MED.DENT. *University of Münster, Germany.*

Osteogenic tumors of the lower jaw: pathogenesis and malignancy of osteochondrosarcoma (Osteogene Unterkiefertumoren: Pathogenese und Malignität der Osteochondrosarkomen). *Gert Muhle. 1957.* DR.MED.DENT. *University of Münster, Germany.*

Treatment of infected roots in deciduous teeth (Tratamiento de conductos radiculares en dientes temporales). *Alfonso Aguilera. 1957.* CIR.DENT. *Pontificia Universidad Católica Javeriana, Colombia.*

Crowns and bridges (Coronas y puentes). *L. F. Castro. 1957.* CIR.DENT. *Pontificia Universidad Católica Javeriana, Colombia.*

Apical curettage (Curetaje apical). *Alicia Gomez. 1957.* CIR.DENT. *Pontificia Universidad Católica Javeriana, Colombia.*

Growth and orthodontic relapse. *Robert R. Kelley. 1959.* M.S.D. *University of Washington.*

Skeletal changes in actinomycosis (Skelettbeteiligung bei Aktinomykose). *Susanne Riegel. 1957.* DR.MED.DENT. *University of Würzburg, Germany.*

Treatment of a traumatic lesion of the second branch of the trigeminal nerve: report of case (Ein klinischer Beitrag zur Behandlung der traumatischen Läsion des zweiten Trigeminusastes). *Philip Berg. 1958.* DR.MED.DENT. *Dental Institute of the University of Zurich, Switzerland.*

Tooth mobility associated with asymmetric masticatory function (Zahnbeweglichkeitsverhältnisse bei asymmetrischer Kaufunktion). *Hans Herzog. 1958.* DR.MED.DENT. *Dental Institute of the University of Zurich, Switzerland.*

Rise in blood pressure during anesthesia induced by an anesthetic solution containing epinephrine (Das Verhalten des Blutdruckes bei Anästhesien mit Adrenalinzusatz). *Robert Koch. 1958.* DR.MED.DENT. *Dental Institute of the University of Zurich, Switzerland.*

Calcification of bicuspids and molars and its relation to the chronologic age and the skeletal development in children from six to eleven years old (La calcification des prémolaires et molaires et ses relations avec l'âge chronologique et developpement squelettique chez les enfants de six à onze ans). *Gérard Boulanger. 1958.* DR.MED.-DENT. *Dental Institute of the University of Zurich, Switzerland.*

Examinations of the changes in toxicity of a local anesthetic after addition of hyaluronidase (Untersuchungen über die Toxizitätsveränderungen eines Lokalanästhetikums bei Zusatz von Hyalurtonidase). *François Lombard. 1958.* DR.MED. DENT. *Dental Institute of the University of Zurich, Switzerland.*

Gingivitis in the school children of Zurich (Gingivitis bei Zürcher Schulkindern). *Zalman Mazor. 1958.* DR.MED.DENT. *Dental Institute of the University of Zurich, Switzerland.*

Electrolytic polishing of gold and dental gold alloys (Die elektrolytische Politur von Gold und zahnärztlichen Goldlegierungen). *Rudolf Schubinger. 1958.* DR.MED.DENT. *Dental Institute of the University of Zurich, Switzerland.*

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